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THE BEHAVIORAL AND ACADEMIC IMPLICATIONS OF HEARING LOSSES  
AMONG ELEMENTARY SCHOOL CHILDREN

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THE RELATION OF HEARING LOSS IN SCHOOL PUPILS TO  
INFORMATION DERIVED FROM (1) SOCIOMETRIC TESTS, (2) SOCIAL  
BEHAVIOR TREND INDEXES, (3) TEACHER JUDGMENTS AND RATINGS,  
(4) PARENT QUESTIONNAIRES, AND (5) STANDARDIZED ACHIEVEMENT  
AND INTELLIGENCE TESTS WERE EXAMINED. THE SUBJECTS CONSISTED  
OF AN EXPERIMENTAL GROUP OF PUPILS WITH VARIOUS TYPES AND  
LEVELS OF HEARING IMPAIRMENT, MATCHED WITH A CONTROL GROUP OF  
NORMAL HEARING CLASSMATES AND A SPECIAL CLASSROOM OF PUPILS  
REPRESENTING CONDITIONS OF MODERATE TO SEVERE HEARING  
IMPAIRMENT. THE STUDENTS WERE FROM FOUR INDIANA PUBLIC SCHOOL  
SYSTEMS, GRADES 4-7, AND AN INSTITUTION. THE FINDINGS IN BOTH  
GROUPS WERE CONSISTENT IN THAT THOSE SUBJECTS WITH HEARING  
LOSS WERE LESS SOCIALLY ADJUSTED AND HAD LOWER AVERAGE  
INTELLIGENCE SCORES, MORE NEED OF APPROVAL IN RATINGS BY  
PARENTS AND LOWER RATINGS IN READING, ARITHMETIC, AND  
SPELLING ACHIEVEMENT. THE SPECIAL CLASSROOM PROGRAM RESULTED  
IN SIMILAR FINDINGS. (GC)

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THE BEHAVIORAL AND ACADEMIC IMPLICATIONS OF  
HEARING LOSSES AMONG ELEMENTARY SCHOOL CHILDREN

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### ABSTRACT

A research study was conducted to assess the behavioral and academic implications of hearing impairment of pupils in regular public school and special classroom settings. The purpose of the study was to examine the relation of hearing loss in school pupils to information derived from 1) sociometric tests, 2) social behavior trend indexes, 3) teacher judgments and ratings, 4) parent questionnaires, and 5) standardized achievement and intelligence tests. The subjects of this investigation consisted of an experimental group of pupils, with various types and levels of hearing impairment, matched with a control group of normal hearing classmates, except in the Special Classroom segment.

In the public school segment of the study, 300 pupils were studied representing grades four through seven in four different Indiana public school systems. The hearing impaired subjects, consisting of 150 pupils, were selected on the basis of recently administered audiometric examinations; the matched control group of 150 normal hearing subjects were randomly selected from the same classrooms. The experimental group was further subdivided by type of hearing loss, monaural versus binaural, and by extent of hearing loss involvement.

In the special classroom segment of the study, pupils were selected to represent conditions of moderate to severe hearing impairment. The



subjects consisted of 77 experimental pupils drawn from four Indiana cities. Relative to the experimental group, 34 were selected from four Oral Training Units in three different public school systems, 29 from three public school special classes for the hard of hearing, and 14 from the Fort Wayne State School for the Mentally Retarded. Information similar to that collected in the regular Public School Classroom portion of the study also was obtained for these subjects.

Within the limitations of the samples studied, the experimental design employed, the qualitative or statistical treatment of data, the reliability and validity of the information collected, the following conclusions were reported:

#### I. Public School Classroom Programs

1. As judged by teachers' ratings, pupils with binaural types of hearing impairment are less socially adjusted than their normal hearing classmates; pupils with monaural hearing loss, on the other hand, are not judged to differ in social adjustment as measured by the same test (Cowell Social Behavior Trend Index).
2. In comparison to their normal hearing classmates, hearing loss pupils, as a group, are judged by their parents to be less frequently popular with other boys and girls, to strain more frequently in listening to persons talking, to seem less frequently interested in conversation, to tire easily or appear restless more frequently, to understand other children less frequently while playing, and to play the radio or TV too loudly more frequently (Parent Questionnaire).
3. Pupils with monaural hearing losses, in comparison to normal controls, as a group, are judged by their parents to misunderstand instructions



more frequently, to strain more frequently in hearing speech, to watch the speaker's face closely more frequently, more frequently to appear restless or to tire easily, and more frequently to play the radio or TV too loudly. They are also judged to understand other children less frequently when playing. (Parent Questionnaire)

4. Pupils with binaural hearing losses, in comparison to normal hearing pupils, are judged to strain more frequently to hear a speaker's voice, and to play the radio or TV too loudly. They are found to be less frequently popular with other boys and girls, to be less frequently interested in conversation, and less frequently to understand other children while playing. It is noted that subjects with monaural hearing impairment receive more undesirable parental ratings than those with binaural hearing loss. (Parent Questionnaire)
5. Hearing impaired and normal hearing pupils are not found to differ significantly in attitude toward subject matter and classroom activity participation as measured by the Pictographic Self Rating Scale.
6. Normal hearing subjects and pupils with hearing loss are not found to differ significantly in the Revised Knox Cube Test employed as a measure of 'visual' memory span; however, a trend is noted in the direction of higher scores for normal hearing pupils.
7. Hearing loss subjects are found to manifest significantly lower average intelligence scores than normal hearing pupils as measured by the Ammons Full Range Picture Vocabulary Test. This difference is attributable primarily to pupils with a binaural type hearing loss and at a loss level of 40-59 db. Moreover, it appears that the differences are primarily attributable to the female negro pupils with binaural hearing impairments included in the experimental group.
8. As rated by teachers, the general classroom performance of hearing impaired pupils is significantly lower than for normal hearing pupils. This finding is attributable primarily to the inclusion of pupils

with binaural hearing losses. However, a trend is present for monaural hearing loss pupils also to be rated lower than normal hearing control subjects.

9. As measured by standard achievement tests (Metropolitan or Stanford), normal hearing pupils are superior to their hearing impaired classmates in average reading and arithmetic achievement, and to a limited extent tend to be superior in spelling achievement.

## II. Special Classroom Program

1. Pupils with moderate to profound hearing impairments tend to receive relatively lower popularity ratings (Sociometric Questionnaire) in the regular classroom than in their special classroom environment both as a group and when levels of hearing loss are considered.
2. Hearing impaired pupils tend to receive less social acceptance as the extent of hearing impairment increases; however, on a relative basis, they would tend at all levels to be within the range of social acceptance as measured by the Social Distance Questionnaire.
3. When making self ratings which reflect awareness of problems related to hearing loss, acoustically handicapped pupils in a special classroom environment do not present consistent response trends (Self Report questionnaire).
4. Relative to behavior, hearing impaired pupils in integrated classrooms tend to be judged by other students as follows: usually quiet and seldom talk, do not speak plainly, and have problems that sometimes make school difficult (Guess-Who Questionnaire).
5. Pupils in Special Classroom Programs (Hard of Hearing Classes and Oral Training Units) generally are rated in the acceptable range of social adjustment by both special and regular classroom teachers. However, significantly more favorable ratings are made by special rather than regular classroom teachers (Cowell Social Behavior Trend Index).



6. Oral Training Center pupils frequently are judged by their parents to manifest greater need for approval than would be the case if normal hearing were present. Parents also indicate that other persons tend to speak louder and use more gestures when the child's hearing loss is discovered. These parents also report that their children rarely tend to be cliquish or to worry about saying the 'right' thing just to please others (Parent Questionnaire).
7. Hard of hearing class pupils are reported by their parents to manifest a relatively strong tendency to need parental approval, to interrupt others while talking, and to show that many of their problems are based upon the hearing impairment. Less frequently mentioned by parents were tendencies toward cliquishness or worry about saying the correct thing to others (Parent Questionnaire).
8. Academic retardation in Special Classroom pupils appears inversely related to the degree of hearing loss (Academic Achievement Tests).
9. Pupils in Special Classroom Programs tend to be consistently below normal grade placement for their chronological age (Academic Achievement Tests).

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## **THE BEHAVIORAL AND ACADEMIC IMPLICATIONS OF HEARING LOSSES AMONG ELEMENTARY SCHOOL CHILDREN**

### **INTRODUCTION**

One of the by-products of the impressive strides being taken in this century in both physical and behavioral sciences is a cultural awareness of the responsibilities that society must assume for hearing handicapped individuals. The ignorance and superstition that prevailed in the medieval period up through the Victorian era have been replaced by effective medical treatment, widespread social services, and varied educational opportunities for the hearing impaired. Although this is true, Hodgson (67), Best (9), and Goldstein (52) have reported that the privileges offered to the hearing handicapped individual still are limited in scope and application.

These limitations imposed upon hard of hearing persons may be due to the public's unfamiliarity with problems of the hearing handicapped. Interestingly, it is to be noted that confusions, primarily semantic, are to be found even among experts in bioacoustics and peripheral areas. In addition, there are striking disagreements among educators of the hard of hearing as to the techniques judged to be most appropriate and most effective for this segment of the population.

The distinction between hard of hearing and deaf children is not always clear-cut. Certain authorities consistently use one or the other

labels to apply to the entire range of auditory impairment. The following hearing-loss classification is adopted from Newby (105) and is employed in the present study( cited by Pauls, M. D., and Hardy, W. G.).

|                          |                          |
|--------------------------|--------------------------|
| Mild Hearing Losses:     | 20 - 40 db below normal  |
| Moderate Hearing Losses: | 40 - 60 db below normal  |
| Severe Hearing Losses:   | 60 - 75 db below normal  |
| Profound Hearing Losses: | 75 - 100 db below normal |

The significance of the hearing loss problem among children and young adults was reported by Frisina (45), based upon the United States population estimate of 1953. The estimated number of hard of hearing and deaf individuals under 15 years of age was 58,700 and 24,400 respectively; the estimated incidence of individuals 15-24 years of age in these categories was 60,900 and 16,700. Silverman (132) estimated that five percent of children enrolled in public schools have some type of hearing impairment and that a minimum of 10 to 20 percent of these children will require a program of special education. The Committee on Hard of Hearing Children of the American Hearing Society also reported a five percent incidence of hearing impairment in school-age children. Of 266,107 school children tested during 1941-1954, the Purdue Public School Hearing Test Service reported that 4.5 percent of the county school population and 3.9 percent of the city school children displayed various levels of hearing involvement. During the same period, school hearing services in states adjacent to Indiana cited the following total figures: Illinois - 5.2 percent, Michigan - 5.0 percent, Ohio - 3.7

percent, and Kentucky - 3.1 percent. An incidence of hearing loss, from three to four percent, was reported by Landes, as cited in Strong (140), in a survey of approximately 50,000 Pennsylvania school children. Johnson, as cited in Frisina (45), reported that, in the forty-million school-age children between five and seventeen years of age, only about 0.5 percent, or 200,000, have hearing problems of communicative and educational significance.

The statistical evidence clearly indicates that the occurrence of hearing impairment among school-age children is sufficient to warrant serious medical and educational consideration. Individuals with auditory disorders need to be identified, diagnosed, and placed as quickly as possible into educational and social programs which will assist them in making appropriate adjustments for eventual self-sufficiency.

When a hearing impairment is superimposed on other handicaps, the gravity of the problem increases, leading Doctor (33) to declare:

Each year the number of such pupils (multiple-handicapped) reported becomes larger. It may be that this situation is brought about by better diagnostic services, or that, educationally, we are becoming more aware of such problems. It may also very well be that medicine in the 20th century is saving the lives of many multiple-handicapped deaf boys and girls, who, twenty-five years ago, would have been in the graveyard... The medical field is doing an excellent job in saving lives, but the teaching profession has become much more complex because of it. Is a relatively uneducated multiple-handicapped child going to be one of the end products of this modern twentieth century?

Frisina (45) also stated that the incidence of multiple-handicaps seems to be increasing in proportions which are likely to demand greater



attention from medical and non-medical specialties. The increase in the discovery of hearing losses, according to Frisina, has resulted from such factors as general population increase, earlier detection, and improved postnatal medical techniques which have swelled the number of multiple-handicapped children that survive.

#### Classification of Hearing Impairments

The labels "deaf," "partially deaf," "hard of hearing," "acoustically handicapped," and "hearing impaired" are but a few of the descriptive terms that have been employed to describe persons who suffer from this sensory dysfunction. These terms usually refer only to gross classificatory schemes and, when unaccompanied by strictly defined hearing loss criteria, become lost in a semantic maze. Even when hearing loss measurements are reported and a descriptive classification is applied, the classification may have only a limited meaning within one investigation or clinical report. Moreover, in many instances in the literature, restrictive classifications have been found to exist with only vague criteria to define them. The semantic problem of categorizing hearing loss is reflected in Appendix I.

Ewing (38), for example, classified children with defective hearing into Grades I, II, or III based upon the need for a hearing aid and the presence or absence of acquired speech. All three grades would have been amenable to education in school if given the required specialized training where it was necessary.

Among others, Pintner (109), Keaster (78), Lesser (84), Hulsing (69), Streng (140), Garrison and Force (48), Siegenthaler and Kraywicki (129), and Gaskill (49) all utilized different criteria from Ewing and, in general, from one another in determining levels of impairment. While they tended to evaluate the degree of handicap according to the audiometric loss for speech or for pure tones, such losses, in decibels, varied from one to the next.

Among current writers and investigators, it appears that the most frequently utilized standard for definitions of hearing impairment is one proposed in 1937 by the Committee on Nomenclature of the Conference of Executives of American Schools for the Deaf (105):

1. The Deaf: Those in whom the sense of hearing is nonfunctional for the ordinary purposes of life. This general group is made up of two distinct classes based entirely on the time of the loss of hearing.
  - a. The congenitally deaf: Those who were born deaf.
  - b. The adventitiously deaf: Those who were born with normal hearing but in whom the sense of hearing becomes nonfunctional later through illness or accident.
2. The Hard of Hearing: Those in whom the sense of hearing, although defective, is functional with or without a hearing aid.

Definitions of deafness, with which the present study will be concerned only to a very limited extent, usually consider the dimensions of the ability to speak, ability to hear, and time of onset of hearing loss. Baker (6) defined deafness in the following terms:

The deaf are those who were born either totally or sufficiently deaf to prevent the establishment of speech and natural language; those who became deaf in childhood before language and speech were established; or those who became deaf in childhood so soon after the natural establishment of speech and language that the ability to speak and understand speech and language has been practically lost to them.

Frisina (46) stressed the transposition of auditory verbal symbols into visual symbols in the following definition:

...the deaf child is one who has sustained a loss of hearing either prenatally, or during infancy of such a degree and type that, for purposes of developing verbal language, he functions principally as a visually oriented being. In his case, the auditory and tactile senses are subordinate or supplementary modalities.

An eclectic view of deafness was offered by Hardy (58), who stated that deafness is an "...auditory impairment of a type and degree which interferes materially with the psychological, linguistic, and social development of the child."

Authorities, in general, agree that the differences between the deaf child and the hard of hearing child are not limited to auditory considerations (58, 59, 111, 131, 140). Hardy (57, 58) remarked that:

...a host of other facts about the child are pertinent, among them: the age at onset of hearing impairment, type of impairment, effects of indicated medical and surgical procedures, home environment, parental insight, physical development and behavioral development.

He also concluded that the relations between physical and psychological conditions are asymmetrical and that many children with a moderate hearing loss are severely handicapped in language and behavior, while



others with more marked auditory impairment can often adjust remarkably well in a normal environment.

Lesser (84) sharply criticized the validity of reported hearing loss statistics on the grounds that they lacked consistency with respect to the type of audiometric technique employed, the frequencies tested, the acoustic conditions of the testing environment, and the calibration and mechanical repair of the testing equipment.

#### Psychological and Social Implications of Hearing Loss

One significant concomitant of psychological and social problems of the person with severe or profound hearing loss has been reported to be the impairment of language development. According to Levine (85), the inability of the preverbal child to hear language results in an ignorance of the basic tool for human communication. Thus, he cannot make significant contacts with the knowledge, customs, culture, and climate of the civilization into which he was born. Myklebust (102) reported that the child with profound hearing loss is limited to a "seen and felt world" that is unreal and unexplored and which results in anomalies of perceptual, conceptual, and emotional behavior. Socialization, according to Myklebust, is accomplished through the internalization of the social controls which the child encounters. In the case of the child suffering from profound auditory impairment, internalization is so inefficient that social contacts with other people are superficial, tenuous, and subject to unusual prerequisites. Hence, the deaf child is left on

the periphery of social situations, unable to participate except when the social event is sufficiently visual in nature to be meaningful to him.

Piaget (108) stated that language is:

...the main factor in the formation of the progressive socialization of the child which is so essential if egocentrism is to be replaced by a capacity for social intercourse, cooperation, and decentration of thinking.

The importance Piaget (108) attaches to social interaction is revealed in the following quotation:

It is through social intercourse that the diffuse, jumbled thinking of the young normal child gradually becomes realistic and logical. Hence, "socialization," or "socialized learning," is indispensable for complete conceptual development. If this process is restricted, the cognitive, emotional, and social development of the child will likewise be retarded.

It would seem that profound auditory impairment poses such a restriction. The negative personality characteristics which have been attributed to the auditorily handicapped are legion. Among the most common traits reported were: emotional instability, lack of independence, initiative and imagination, withdrawal behavior with concomitant anxiety, shyness or aggressiveness, overcompensation, recalcitrance, depression, suspicion, irritability, impulsiveness, suggestibility, and egocentricity (106, 60, 62, 133).

Near unanimity of opinion exists concerning the disturbances in social relationships and emotional development which result from failure of perceptual and conceptual thinking to occur normally. Failure

of the deaf to ascribe appropriate meaning to social situations and interpersonal behavior was discussed by Levine (85), Myklebust (102), and Piaget (108). Myklebust (102) theorized that the inability of the deaf to relate to others through vocalization results in reduced ability to ascribe meaning to social situations.

Early attempts to study the behavioral aspects of profound hearing loss objectively were begun in the late Nineteenth Century and early Twentieth Century, and were directed toward solving practical problems of educational significance. A recent study (76) investigating profound auditory impairment in children revealed that these children were poorly integrated and not accepted socially by the hearing members of a classroom. The social implication of profound hearing loss, as viewed by the deaf child himself, was reported by Fusfeld (47). He obtained responses of young deaf persons, in a questionnaire dealing with the advantages and disadvantages of their hearing impairment, and found that a preponderance of social disadvantages was listed by the deaf. Another test employed by several researchers -- the Haggerty-Olson-Wickman Behavior-Rating Scale -- revealed that the deaf had more social and behavioral problems than did comparable hearing groups (102, 135, 138). Pintner, et al. (111), described tendencies in the deaf toward greater introversion, reduced self-sufficiency and dominance, withdrawal from social participation, lack of independence, and a desire to be younger. Retardation of social development and adjustment was reported in investigations utilizing comparable groups of



deaf and hearing subjects (2, 19, 22, 41, 55, 98, 110, 141). A frequently employed test for measuring social maturity, which has been utilized as an objective and valid measure for the hearing impaired, is the Vineland Social Maturity Scale. The reported social maturity of the profoundly hearing impaired groups has varied from a normal Social Quotient (167) to as much as a 20 point Social Quotient deficit (16, 98).

Certain research into an investigation of the psycho-social differences among the auditorily handicapped has failed to differentiate between the behavior of "speech deaf" versus the "non-speech deaf" (16). Pintner (111) studied a group of deaf individuals who were communicating predominantly by means of speech and found them to be better adjusted than a group of deaf individuals who communicated predominantly through writing.

While the research evidence strongly suggests the psychological and social inferiority of the profoundly hearing handicapped person, Fusfeld (47) refused to accept the assumption that deafness produces a stereotyped individual:

There is no such entity as the deaf child or the deaf person. In the first place deafness is a latitudinal experience over the frequency range of decibel loss as well as longitudinal experience over the frequency range with all the complicated combinations possible by crossing of these two sets of axes. And even if the counselor has on his desk an accurately plotted audiogram, his judgments must be conditioned further by such facts as the time of onset of deafness, the particular cause, the physical sequelae if any, and the mental and emotional accompaniments.

Levine (85) also stated that:

The deaf child comes into the world with the same psychological needs and potentials as the one who hears. The inner well-being of deaf individuals is subjected to the same psychological principles that govern the well-being of us all. It is not the deaf person who is innately different, nor his psychology that is intrinsically "unique". It is his environment that is wanting.

In criticism of the research which has grown out of exploration of the social and personality development of the profoundly auditorily impaired, DiCarlo and Dolphin (32) declared:

Most of the research fails to equate the semantic dynamics involved, does not control the groups in terms of language variables, and fails to utilize standardized measurement criteria. So far the research shows a need for better controls, better measuring instruments, clearer insight into the nature of deafness and its relationship to individual growth. More extensive techniques and development of a frame of reference standardized on the deaf themselves may help to realize these objectives.

Few data are available to explicate the psychological and social problems of the hard of hearing. Numerous empirical observations, however, have been reported which suggest some commonality of behavior problems which characterizes these children. Roser (120) proposed that hearing impaired persons possess a "hard of hearing syndrome" which comprises irritability, fearfulness, suspicion, and negative mental images. According to Roser, such aberrant behavior appears to result from repeated failure in social relationships. Pintner (111) found that the hard of hearing child was not as emotionally stable as



the hearing child and that normal adjustment was therefore more difficult for him. Hardy (59) strengthened this tenet when he stated that the hard of hearing child is frequently regarded as being slow, inattentive, overaggressive, or underassertive, and is commonly found among the ranks of problem children at home and in school.

In a comparison of two groups of boys, one hard of hearing and the other normal hearing, Hardy (59) and Habbe (61) reported that the two groups were very much alike on personality tests and rating scales except that the hard of hearing group emerged as slightly more submissive and introverted than the normal hearing group.

In an attempt to determine if ten children with mild to moderate hearing losses could be distinguished from ten normal children relative to Rorschach protocols, Fielder and Stone (39) submitted their test results for professional interpretation. No significant differences were found between the hearing defective children and normal controls, nor did clusters of Rorschach traits, termed "deprivation syndrome," differentiate between the two groups.

One of the earliest attempts to study the social problems of the hard of hearing was undertaken by Madden (90). Teachers rated matched groups of hearing and hard of hearing children on the traits of attentiveness, obedience, leadership, social attitude, and aggressive-withdrawal behavior. Madden found that no differences existed between the two groups in ratings of attentiveness, obedience, and social attitude. However, the hard of hearing were rated lower in leadership ability and were



definitely less aggressive. A more recent study was directed toward assessing the influence of hearing loss on school adjustment in which Reynolds (118) found that, even though control subjects participated more frequently than the experimental subjects and were more skillful in playing ground games, children with a hearing loss in the regular school program adjusted to their school environment as favorably as did the normal hearing children. Elser (37) investigated the social position of 45 hard of hearing pupils in the third through seventh grades, and concluded that they were not as well accepted as the average of their classmates on the basis of friendship scores nor did they earn as favorable reputation scores as their classmates. On the basis of personal interviews, Elser found that classmate rejections were made on the basis of unacceptable social behavior and were not related specifically to auditory deficiencies. Further evidence of social inadequacy in the classroom setting is supplied by Force (43) who studied physically handicapped children (including those who were hearing impaired) and normal children, in grades one through six. The hearing impaired children received fewer friendship, workmate, and playmate choices than did normal members of their class. Force concluded that the hard of hearing children were not positively integrated into the regular classroom setting.

Certain problems arising in the classroom were reported by teachers for a group of 76 hard of hearing school children. According to Edwards (35), teachers reported that the following behavior patterns

were exhibited by these children as follows:

| <u>Behavior Pattern</u>        | <u>Number of Children</u> |
|--------------------------------|---------------------------|
| Inattention                    | 26                        |
| Indifference                   | 16                        |
| Short attention span           | 14                        |
| Inability to follow directions | 15                        |
| Inability to keep place        | 10                        |
| Request for repeated questions | 22                        |
| Strained expression on face    | 23                        |
| Turning to one side            | 7                         |
| Timidity                       | 17                        |
| Sullen                         | 4                         |
| Overly sensitive               | 7                         |
| Behavior problem in classroom  | 8                         |
| Behavior problem on playground | 9                         |
| Indifferent to school work     | 8                         |

The reported trends suggest that, as hearing loss increases, aggressive behavior, introversion, and emotional instability increase slightly. Other problems include poorer general adjustment, greater defensive behavior, lack of self-confidence, reluctance to play with others, fewer friends, and greater difficulties in the hearing environment at home and at school. However, the reported differences between normal hearing and hard of hearing children generally are slight. Information derived from adjustment questionnaires and tests (5, 61, 109), personality tests (40, 61, 111), behavior ratings (61, 90), and interviews (130) revealed statistically non-significant differences between the hard of hearing and comparable normal hearing groups.

#### Intellectual and Achievement Implications of Hearing Loss

The early measurements of intellectual capacities and abilities, based largely upon verbal language contrasts, were often crude and

rarely satisfactory for use with the auditorily handicapped. Striving for better measuring instruments, the pioneer team of Rudolph Pinter and D. G. Paterson developed performance tests and non-language tests relying upon the manipulation of concrete objects or percepts in terms of concrete situations rather than abstractions which were dependent upon verbal language ability. As a reflection of intellectual capacity, these and other studies of the intellectual abilities of individuals with profound hearing impairment are listed in Appendix 2.

In summary of the review presented in Appendix 2, it may be stated that performance scales and non-verbal tests, by and large, did not reveal significant differences in the intelligence of comparable hearing and hard of hearing groups. On the other hand, inferiority of intellectual ability for the deaf was reported in two investigations which utilized Raven's Progressive Matrices (49, 111). Tests of intelligence highly saturated with verbal and language items seldom failed to reveal marked inferiority for deaf groups (49, 111). In contrast, tests of educational attainments and abilities disclosed considerable retardation for severely and profoundly hearing impaired children.

Comparison of the congenitally and adventitiously deaf on intelligence tests of the performance type revealed no difference between the two groups (49, 51, 98, 111). However, performance on intelligence tests of the verbal type (111), tests of abstract reasoning ability (143, 144), and scores obtained with Raven's Progressive Matrices (107), was significantly related to age of onset. In other investigations dealing with



intelligence, positive relations have been reported between intelligence scores and the variables of socio-economic status (8, 79), nursery school attendance (79), teachers' ratings of intelligence and adjustment (97), presence of multiple handicaps (103), and prediction of future school achievement (11).

Investigations of the educational setting and its relation to intellectual factors revealed that day school enrollees earned higher scores than did institutionalised children on performance tests (96, 97), as well as on non-verbal group intelligence tests, reading vocabulary and arithmetic scores (96), and on tests of reasoning ability (143). The most commonly advanced explanation of this finding has been that in contrast to institutionalised children, day-school enrollees, on the whole, probably display less severe hearing loss (144). The magnitude of hearing loss was demonstrated to be inconsequential on performance type tests (49, 79, 96), but degree of loss was significant when tests of abstract reasoning and reading vocabulary were the measuring devices (96). Investigations of sex difference in intellectual performance have revealed a non-significant difference for this variable (79, 96, 97, 98, 111).

Tests of cognitive ability were employed by Rosenstein (142, 143, 144) in testing for differences between normal and hearing impaired children. Utilising tests of abstract reasoning, Templin reported that differences were found to be most apparent in reasoning which depended upon specific training. Marked differences between deaf and hearing

children were also found for tests of verbal abstraction, non-verbal reasoning by analogy, and explanations of physical causality.

The cognitive ability of oral deaf children versus normal hearing children revealed no differences between the two groups in ability to perceive, to abstract, nor to generalize about visually presented material when the deaf child was familiar with the language employed (119).

Modifications in test administration through manual alphabet, sign language, and gestures have been employed with the deaf (34, 66, 79, 107, 111), and at least one test was standardized with pantomimed instructions.

A summary appraisal of the intellectual implications of hearing loss was made by Myklebust (101):

...it is becoming clear that hard of hearing children should not be considered inferior in intelligence as compared to the normal. However, the use of their intelligence, that is, the qualitative aspects of their perceptual and conceptual functioning and their reasoning does seem to be different...

#### Educational Problems of the Hard of Hearing

The educational implications of a serious auditory handicap present some of the most controversial and challenging problems facing educators today. One significant problem concerns the categorization of existing hearing losses into meaningful educational classifications. DiCarlo (32) points out that classifications which are constructed on audiometric findings, etiology, advent of hearing loss, personality, intelligence quotient, and other factors violate educational principles since the

program must serve the hearing impaired child and, at the same time, respect the uniqueness of his individuality.

Whereas the profoundly deaf child is usually enrolled in a residential school, those children with less severe hearing disorders may receive their education in a day school, a special class within a regular school, or in full-time attendance in a regular classroom. Within the public school system, two major types of programs for the hearing handicapped child have been shown to exist. One program is a highly integrated one whereby the child receives the bulk of his academic instruction in the regular classroom along with normal hearing children. The other type of program incorporates homogeneous groupings of hearing handicapped children who receive their instruction from a specially trained teacher. In supporting the first type of program, Silverman (131) suggested that, while the welfare of the hard of hearing child should be entrusted to specially trained personnel, remedial measures should be executed outside the framework of the regular school system. It is important that the hearing handicapped child be convinced that he is essentially normal, with a particular need that has been recognized. When this is achieved, he has hurdled the chief obstacle to his adjustment. Bender (7) proposed that such a child is:

...better off carrying his handicap with him every day into the world in which he must inevitably live and compete and learning to compensate is a habitual part of living.

Yenrick (151) is opposed to the trend to place handicapped children with non-handicapped children. He stresses the need for caution:



There are many incidents where parents do not fully realize the enormity of the academic, social, and growth problems confronting a deaf child and they run the risk of putting their child in a hearing class which is not correlated with his proper place in his total educational program.

The educational achievement of acoustically handicapped children in a regular classroom setting was studied by Justman, et al., (76). Based on their findings, the researchers concluded that the average gain in academic areas for the handicapped children was comparable to that of the normal hearing children of average intelligence. In addition, the hearing impaired children gained in self-confidence, independence, social awareness, and increasing acceptance of the need to conform to group standards. It would appear then that the scholastic environment is closely related to how far the hearing handicapped pupil can develop within his own restricted limits. Bindon (10) has stated:

All things being equal, the mental and emotional development of such a child may be considered a singular reflection of the quality and effectiveness of the educational forces concentrated upon him.

#### Preferential Sociometry and Related Measurements

Since a primary goal in the present study is the assessment of relations between degree of hearing loss and certain sociometric measures, a review of the studies in the latter area was conducted, with results reported below. Investigations of the relations between intelligence and social status revealed both non-significant and low positive coefficients (16, 40, 71, 128, 145, 152). The relation between academic achievement and sociometric status, however, was not significant in several

investigations (16, 128, 152). On the basis of these findings, it would appear that intelligence and academic achievement played a relatively minor role in friendship choices.

Chronological age, however, has been found to be positively related to sociometric status (71, 126, 145). Sex also was found to be an important element in determining social relations (29) and attractions between the sexes were found to change markedly with maturity (95). Socio-economic factors were found to have a small positive relationship in friendship choices (16, 29, 71). Personality factors, as measured by paper-pencil group tests, were not found to be significantly related to sociometric status (16, 143, 145), although low positive coefficients were reported by one investigator (17). Self-ratings were reported to have, in general, low validity when sociograms (122) are used as outside criteria, and Bonney (17) found only low correlation between self-ratings and social status. Such factors as position in the family and number of siblings were not found to be significantly related to social status (145) while the relations involving interest (16, 71), athletic ability, cleanliness, and courtesy (126) were found to be of limited strength and significance.

Investigations of teacher evaluation of sociometric status versus peer-determined sociometric status revealed marked inconsistencies (20, 55, 94, 152). Teachers, however, displayed great variation in accuracy. High levels of stability of sociometric measurements have been reported for children in three kindergarten classes (134), in high



school (24), and in a college preparatory school (95), when measured after a three month interval (95, 134), as well as for a three year interval (27).

Sociometric investigations of auditorily handicapped groups in classrooms of normal hearing children revealed that they did not enjoy the more favorable social positions of their hearing classmates (37, 43, 76). In a residential school setting, deaf children who were significantly older or younger than their classmates, or who were impaired by additional physical handicaps, were found to occupy an isolated or rejected social position within their classroom, while deaf children who had deaf parents enjoyed a more favorable social position (59). In contrast, another investigation (117) reported no relations between social status and age, deaf parents, or age at onset of deafness.

Potashin (116) cautioned researchers concerning the danger of overinterpreting information gained from the use of sociometric measures.

She stated:

The sociometric approach may give important information about the function of the relationship within the total environment, but it cannot show its structure from within, its dynamics, and the qualities of interaction which it requires. Because it is a dynamic relationship, an attempt to study it from within must permit it to function in this way and not reduce it to mechanistic rigidity by statistical procedure. We must stress the qualitative rather than the quantitative aspect of the problem, and we must study it in action under conditions which are as close as possible to the normal.

It appears, from the review, that the majority of investigations involving sociometrics with hard of hearing children in regular classrooms,



special classes, integrated camping groups, and institutions suggest that the social organization of these children, within any specified age range, resembles that of a younger aged group. The caution expressed by Potashin (116) should be exercised in the report of this general conclusion, namely, that the statistical analyses, from which conclusions were drawn, requires the assumption of normality of distribution of critical variables within the population studied. Clearly, this assumption is questionable in many of the studies reviewed.

Much that was confusing and contradictory was encountered in the published reports of the academic implications of hearing loss. However, it seems generally safe to conclude, from the many studies in the area, that academic or intellectual sequelae of congenital or acquired hearing loss (if present) are related to the severity and duration of the loss.

A much closer agreement among the investigations reviewed was noted within the psychological and social adjustment areas for the hearing impaired school-aged child. The general conclusion of these investigations was that the presence of a hearing deficiency may tend to result in certain deviations from psychological and social adjustment and cause a reduction in some privileges that are enjoyed by normal hearing children.

In summary, it should be stated that research is needed to delineate the academic and social sequelae which might be expected to occur for the hard of hearing child. If these sequelae are found to be directly proportional to the degree of severity of hearing handicap,

practical recommendations for the public school systems might then be derived.

In the present study, the experimental techniques and materials utilized were chosen, in large part, by virtue of their accessibility to public school administrators. It was hoped that this selection of materials would enable any teacher, principal, or school superintendent to utilize the information which could be found in school records in order to predict the potential which a hard of hearing child might possess for adequate behavioral and social adjustment in the public school classroom.



### STATEMENT OF THE PROBLEM

The present investigation was designed to study the implications arising from varying degrees of hearing losses with respect to behavioral and academic adjustment of children within regular classroom environments and special classrooms for acoustically handicapped children. Also, set aside for special consideration were problems of children who have hearing impairments superimposed upon the handicap of mental retardation.

More specifically, this investigation attempted to examine statistically the relations between hearing losses occurring in school-aged children, and scores achieved in sociometric test batteries, social behavior trend indexes, teacher interview data, parents' reports, parent questionnaires, academic tests, grade placement, and standardized achievement tests. Matched hard of hearing experimental and normal hearing control elementary school-aged subjects were used. The three major areas which were tested and analyzed in this investigation for behavioral and academic deviations were: 1) variables thought to be generally descriptive of the sample of subjects; 2) the sub-tests which could be classified as measures of behavior; and 3) the sub-tests which could be classified as measures of academic performance.

The data which reflected social adjustment in the classroom and home environment as expressed by teachers, parents (or the parent substitutes



utilized with the institutionalized experimental subjects) were acquired through rating scales, questionnaires, sociometric measures and interviews. The data for academic performance were obtained through standardized group reading and achievement tests.

Relative to the subject sample in this investigation, the following questions were asked:

1. With respect to the generally descriptive variables of the total sample - parent occupation, parent age, parent highest school grade completed, number of siblings in the family, subject's position within the sibling group, and number of schools attended - are there differences which may be indicative of either the type (monaural or binaural) or extent (audiometric decibel threshold value) of hearing impairment?
2. With respect to the measures which could be classified as indications of behavioral adjustment - Cowell Social Behavior Trend Index, Social Distance, Self-Report, Guess-Who, Parent Report and Questionnaire, Teacher Ratings, Pictographic Self-Rating Scale - are there differences which are characteristic of the experimental and control group relative to type or extent of hearing impairment?
3. With respect to measures of academic achievement and potential for academic success - Metropolitan or Stanford Achievement Test, Teacher ratings, Ammons Full Range Picture Vocabulary Test, Revised Knox Cube Test - are there

significant differences between the experimental and control groups relative to type and extent of hearing impairment?

4. Which of the following variables (or combinations of variables) are related to the type or extent of hearing loss for the pupils tested?

1. Measures of social adjustment and attitudes
2. Parents' ratings (report and questionnaires)
3. Visual memory span
4. Intelligence Quotient
5. Teacher ratings
6. Achievement test results
7. Sociometric data

## PROCEDURE

This investigation was concerned with relations between audiometric findings, as measured by pure tone decibel values, and the behavioral and academic performance of children enrolled in public school classrooms, special classrooms for the acoustically handicapped, and classrooms in an institution for the retarded.

Originally a three-by-three lattice model of nine cells was tentatively selected as a possible design for subdivision of the experimental subjects. In the case of the public school sample, these cells were to be filled on the basis of current audiometric testing conducted in grades four and seven by the Purdue University Public School Hearing Test Service. Equal numbers of control subjects were to be drawn from the same sample sources in which these experimental subjects were found. However, on the basis of a pilot investigation, it was found that field conditions negated the execution of the original lattice model.

The experimental design employed in this investigation consisted of the following categories of hearing loss: 1) no loss (control group); 2) monaural loss; and, 3) binaural loss. Categories 2 and 3 were further divided into sub-categories based upon average speech frequency loss (500, 1000, 2000 cps) for monaural subjects and the better ear speech frequency average for binaural subjects. The five monaural hearing loss levels



were: I - borderline (<20 db), II - mild (20-39 db), III - moderate (40-59 db), IV - severe (60-74 db), and V - profound (+75 db). The hearing losses of the binaural subjects were categorized into four levels as follows: I - mild (20-39 db), II - moderate (40-59 db), III - severe (60-74 db), and IV - profound (+75 db).

In addition to obtaining data from grades four and seven, it also was found possible to include subject information from grades five and six. All subjects were classified eventually according to school grade, race, sex, type of hearing loss (no loss, monaural, binaural), and extent of loss (the sub-categories within the monaural and binaural hearing loss categories).

The object of this investigation was to sample subjects who possessed a wide variety of types and degrees of hearing impairments. To reflect the importance of variables associated with moderate to profound hearing losses, experimental subjects were selected from hard of hearing classes, oral training schools, and a state institution. On the other hand, experimental subjects displaying mild to moderate hearing problems were obtained from the reported public school programs. The assignment of these children into prescribed hearing loss categories was accomplished through audiometric test results obtained by the Purdue University Hearing Test Service or the local school hearing test programs. Wherever noted, control subjects were matched according to age range or to the specific school or classroom grade in which the experimental subjects were enrolled. In succeeding sections,

hearing loss in experimental subjects will be discussed separately under the two headings: Special Classroom Program and Public School Program.

Subjects: Special Classroom Group

The experimental group in the special classroom program consisted of auditorily impaired children possessing moderate to profound hearing losses. They were enrolled in four oral training units, three special classrooms for hard of hearing children, and in a State School for the Mentally Retarded. The total group consisted of 34 pupils from the public school Oral Training Units, 29 from the three public school special classes for the hard of hearing, and 14 from the Fort Wayne State School for the Mentally Retarded. These 77 subjects ranged in age from five years, six months to twenty-three years, two months.

Oral Training Centers. Two of the oral training units utilized in this study were situated in Ft. Wayne, Indiana; a third unit was in Muncie, Indiana; and the fourth unit was located in South Bend, Indiana. Thirty-four experimental subjects were included from these four oral training units.

The four oral training unit classrooms were located in elementary school buildings and were equipped with special audio equipment such as desk hearing aids, phonographs with head-set attachments, master microphones and individual desk microphones.



The age range in the Ft. Wayne Oral Training Primary Unit was five years, seven months to eight years, six months with a mean age of six years, eight months. The age range for the Ft. Wayne Intermediate Unit was from eight years, two months to thirteen years, one month with a mean age of ten years, ten months. Of the eight children composing the primary unit, three attended regular classrooms for a short period each day. Five children from the intermediate unit were integrated daily in a regular classroom for short periods.

The Muncie oral training class contained seven children with a mean chronological age of seven years, one month and a range from five years, six months to nine years, nine months. None of these children received instruction in a regular classroom. The speech development work of the oral training teacher was augmented by daily individual speech therapy, with the speech and hearing therapist assigned to the Muncie special education program.

Nine children, with a mean age of seven years, four months and an age range from five years, seven months to nine years, eleven months composed the South Bend oral training class. Three of the nine children from the unit attended a first grade classroom.

Hard of Hearing Classes. The hard of hearing classes utilized in this study were part of the special education programs being maintained by the respective school systems. In Muncie, Indiana, the hard of hearing class was integrated with the oral training class and two additional classrooms for the physically handicapped. Eight hard of hearing



children and eight physically handicapped children were enrolled in an ungraded classroom. The mean age for the hard of hearing group was ten years, two months. Ages for the combined group ranged from eight years, eleven months, to eleven years, eleven months. While none of the hard of hearing subjects was integrated into a graded public school class, special daily instruction in lip reading, auditory training, and speech therapy was provided by the speech and hearing therapist assigned to the special education department.

The hard of hearing class in the Evansville school system was one of a large number of classrooms provided for handicapped children. One wing of a modern elementary and junior high school building was designed to accommodate a wide variety of physically, mentally, and acoustically handicapped children. Nine children ranging in age from nine years, three months to seventeen years, three months, with a mean age of thirteen years, four months, occupied the hard of hearing classroom. This room was equipped in the same manner as the oral training units. Instruction was provided for graded academic subjects and for the special skills of auditory training, lip reading, and speech improvement. Seven of the nine class members were integrated into at least one regular classroom, and several students attended two or more regular classes.

The twelve hard of hearing children receiving instruction in the South Bend special education program attended regular public school classes on a full-time integrated basis. This group ranged in age from seven years, three months to fourteen years, seven months, with a mean

age of ten years, six months and a grade placement range from first through eighth grade. These subjects coalesced as a group only for a brief home-room meeting in the morning and during lunch period. Special instruction in auditory training, lip reading, and speech was provided by a speech and hearing therapist who worked with the children in small groups based upon age and grade placement.

State Institutional Classes. The multiple-handicapped hard of hearing subjects were residents of a large state school. The fourteen experimental subjects ranged in age from nine years, seven months to twenty-three years, two months, with a mean age of sixteen years, five months. The subjects were selected to represent a population of multiple-handicapped children enrolled in an institutional academic program. The physical facilities, materials, and instructional methods were similar to an elementary school academic program.

#### Subjects: Public School Program

The total population utilized in the public school program of this investigation consisted of 150 children in the experimental group and 150 children in the control group from the fourth, fifth, sixth, and seventh grades in four public school systems. A detailed description of the subjects within grades, with respect to hearing loss, sex, and race is given in Figures 1 through 5. The number and severity of monaural and binaural experimental and control subjects in the Public School Program were as follows:



| <u>Monaural Loss</u> |                | <u>Severity (Level-db)</u> |                  | <u>Binaural Loss</u> |                |
|----------------------|----------------|----------------------------|------------------|----------------------|----------------|
| <u>Exper.</u>        | <u>Control</u> |                            |                  | <u>Exper.</u>        | <u>Control</u> |
| 7                    | 7              | I                          | Borderline (<20) | --                   | --             |
| 26                   | 26             | II                         | Mild (20-39)     | I                    | 17             |
| 19                   | 19             | III                        | Moderate (40-59) | II                   | 30             |
| 7                    | 7              | IV                         | Severe (60-74)   | III                  | 15             |
| <u>20</u>            | <u>20</u>      | V                          | Profound (+ 75)  | IV                   | <u>9</u>       |
| 79                   | 79             |                            |                  | 71                   | 71             |

In the fourth grade a total of 62 children, 31 in the experimental group and 31 in the control group, were incorporated from the public schools. The experimental group included 15 white males, 3 negro males, 7 white females, and 6 negro females. The control group included 11 white males, 4 negro males, 14 white females, and 2 negro females. Figure 2 shows the division of race and type of hearing loss within the fourth grade population. The identical information is shown for fifth, sixth, and seventh grades in Figures 3, 4, and 5, respectively.

A total of 100 children was found in the fifth grade, with 50 in the experimental group and 50 in the control group. The experimental group included 17 white males, 6 negro males, 25 white females, and 2 negro females. The control group included 15 white males, 4 negro males, 25 white females, and 6 negro females.

In the sixth grade a total of 52 children, 26 in the experimental group and 26 in the control group were utilized. The experimental group included 8 white males, 4 negro males, 9 white females, and 5 negro females. The control group included 10 white males, 2 negro males, 7 white females, and 7 negro females.



|             |       | EXPERIMENTAL |        | CONTROL |        | Sub-<br>Total | Total |
|-------------|-------|--------------|--------|---------|--------|---------------|-------|
| Grade       | Race  | Male         | Female | Male    | Female |               |       |
| 4           | White | 15           | 7      | 11      | 14     | 47            | 62    |
|             | Negro | 3            | 6      | 4       | 2      | 15            |       |
|             |       | 31           |        | 31      |        |               |       |
| 5           | White | 17           | 25     | 15      | 25     | 82            | 100   |
|             | Negro | 6            | 2      | 4       | 6      | 18            |       |
|             |       | 50           |        | 50      |        |               |       |
| 6           | White | 8            | 9      | 10      | 7      | 34            | 52    |
|             | Negro | 4            | 5      | 2       | 7      | 18            |       |
|             |       | 26           |        | 26      |        |               |       |
| 7           | White | 17           | 15     | 19      | 18     | 69            | 86    |
|             | Negro | 5            | 6      | 4       | 2      | 17            |       |
|             |       | 43           |        | 43      |        |               |       |
| Grand Total |       |              |        |         |        | 300           |       |

Figure 1. The Total Experimental and Control Public School Subject Stratification by Grade, Race, and Sex.

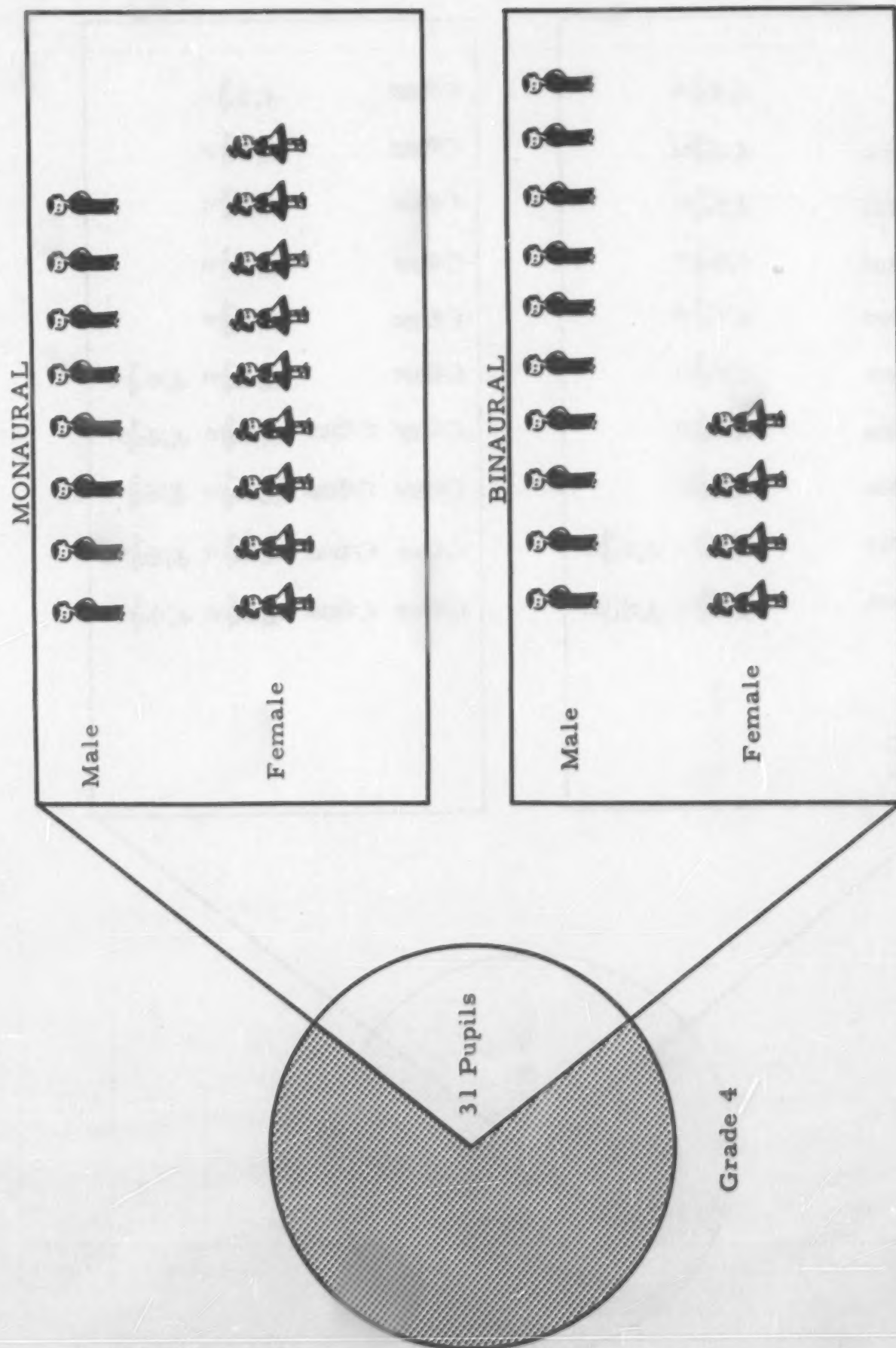


Figure 2. Distribution of Subjects in Grade 4 in the Public School Program by Sex and Type of Loss

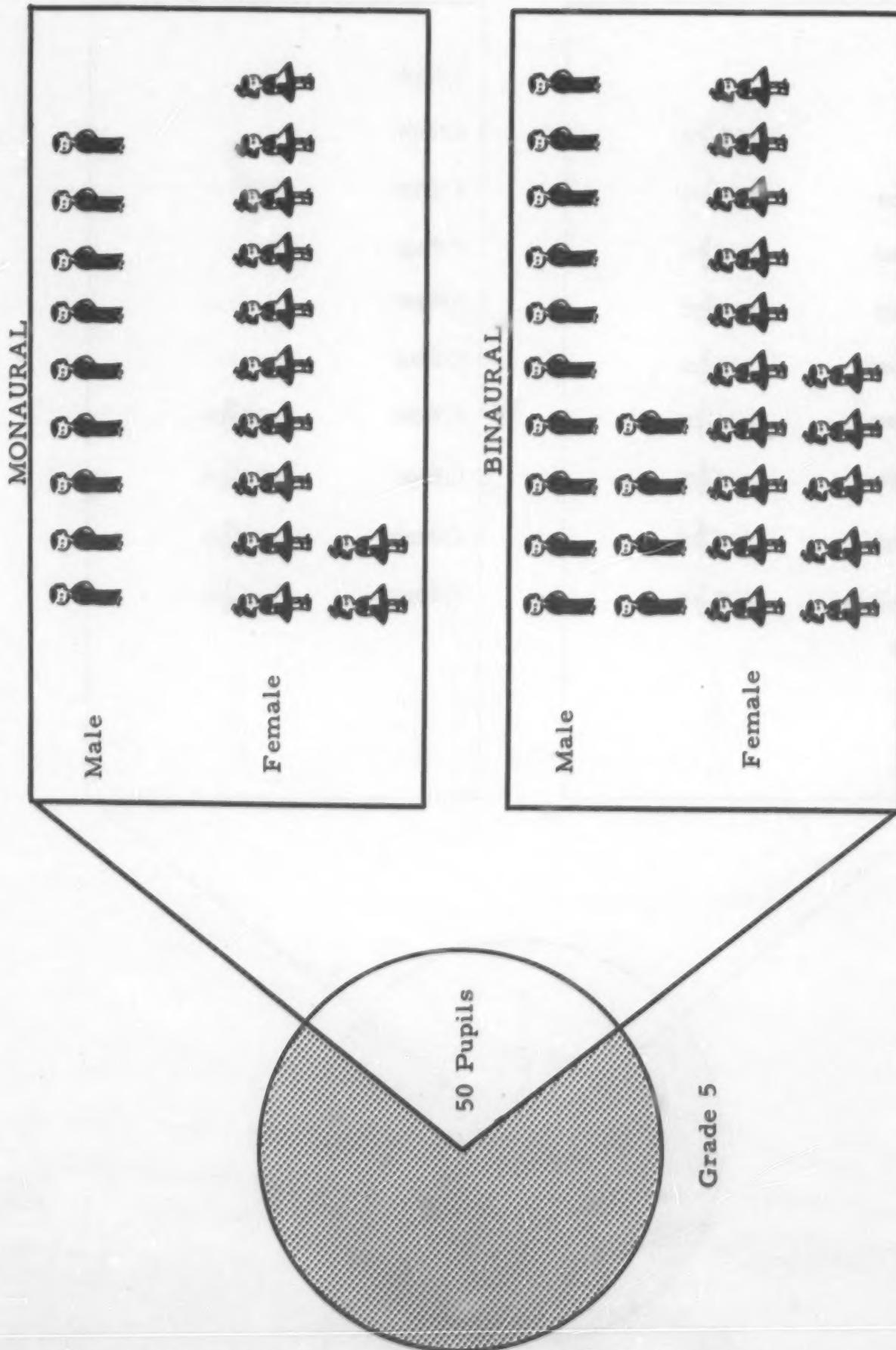


Figure 3. Distribution of Subjects in Grade 5 in the Public School Program by Sex and Type of Loss



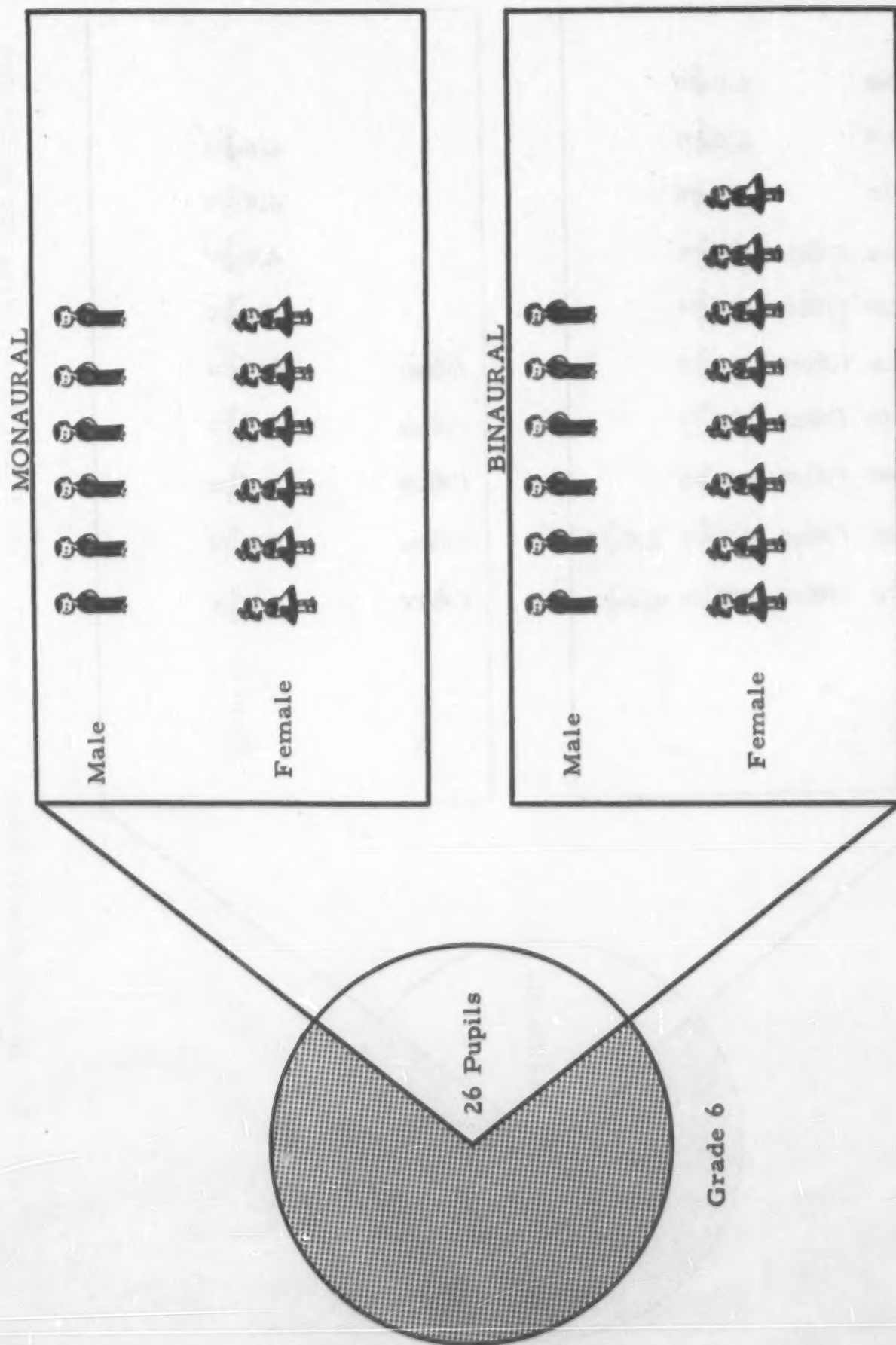


Figure 4. Distribution of Subjects in Grade 6 in the Public School Program by Sex and Type of Loss

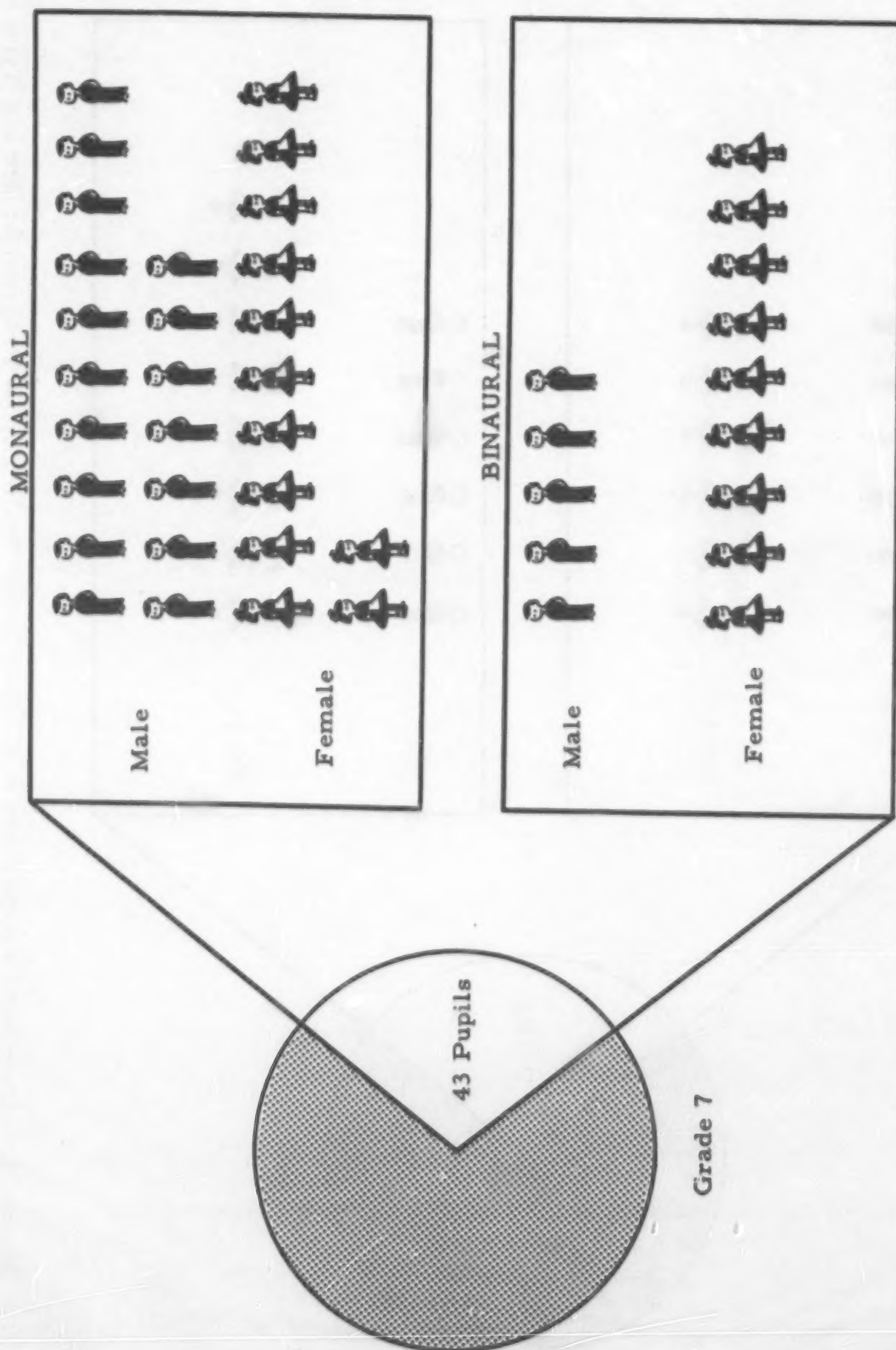


Figure 5. Distribution of Subjects in Grade 7 in the Public School Program by Sex and Type of Loss

A total of 86 children were tested in the seventh grade, 43 in the experimental group and 43 in the control group. The experimental group included 17 white males, 5 negro males, 15 white females, and 6 negro females. The control group included 19 white males, 4 negro males, 18 white females, and 2 negro females.

Method: Special Classroom Program

Preliminary Procedure. Prior to any data collection, the selection of appropriate tests and techniques for the investigation was made and a pilot study was run to determine the actual class time that would be required to complete the sociometric tests, teacher ratings, teacher interviews, and parent interviews.

Next, letters of inquiry were sent to the directors of the oral training centers and special education programs to delineate the purposes and requirements of the investigation, to determine the availability of subjects, to elicit assurance of support and cooperation, and to obtain an appointment for discussing the details of data collection.

The initial appointment with school officials was made with the director of the special program, the principal of the school in which the training unit was located, and with the special teachers of the potential experimental subjects. At this first meeting, the research design was outlined and the amount of teacher involvement was estimated.

In each school system, the school principal was asked to assume the responsibility for notifying classroom teachers of the dates the research



project was to be conducted in their school. Each principal scheduled a meeting for the investigator to discuss the project with the teachers of the experimental subjects. A form letter was sent through the principal's office to the parents of the experimental subjects, requesting their participation in an interview. Parent interviews were scheduled in the school whenever possible, but some home visits were necessary when transportation difficulty, child care, and work schedules precluded a visit to the school.

Meetings with the regular classroom teachers were held after school on the first day of the investigator's visit. At this meeting, each teacher was presented with a cover letter explaining the purposes of the experiment, instructions for administering each of the sociometric tests, and forms for recording test responses. The tests, according to grade level, were distributed to each teacher along with the A and B Forms of the Social Behavior Trend Index. An informal discussion of the purpose of the study was encouraged, to augment previous information and to review each of the tests in the sociometric test battery. Directions to the teachers for the presentations of the sociometric tests were the following:

1. Each sociometric test should be presented to the class in a casual way, yet in such a manner that the children will approach the task seriously, honestly, and with interest.
2. The children should be assured that only the teacher will see their choices.
3. The teacher, if asked for an explanation of the tests, should state that she is interested in the information for the purpose of learning more about friendships within the room.

4. The name of each class member should be written in alphabetical order on a chalk board visually accessible to all the class members.
5. Children should be allowed to choose any children in the room, whether the child is in attendance or not.

Each teacher was encouraged to present the sociometric tests in the manner to which their children would best respond. No limitations were made concerning the sequential order of test administration nor as to the number of tests that were to be given at one time.

Individual audiometric pure tone threshold tests were administered to all the experimental and control subjects, with the exception of those in the Ft. Wayne oral training units and the Muncie oral training unit. In these units, audiometric data were taken from audiograms obtained by the audiologists in the two systems.

Test Description. The following measures of social and behavioral adjustment were utilized in this study:

1. Sociometric Questionnaire
2. Social Distance Questionnaire
3. Guess-Who Questionnaire
4. Self Report
5. Cowell Social Behavior Trend Index
6. Parent Interview
7. Parent Questionnaire
8. Parent Report
9. Teacher Interview

The Sociometric question, in which the child nominates his best friends in preferential order, is one of the more common sociometric methods used in establishing a hierarchy of socialization within a group. The Social Distance rating is a technique utilized in establishing sociograms within groups of children and adults. The Guess-Who rating,



often described as a "reputation" test, is a technique whereby behavior trait ratings of a group of children may be obtained by using the members of the group as raters. This is a method of obtaining information regarding the manner in which members of a group perceive one another. Included in the twelve-item Guess-Who rating scale were some of the problems commonly reported to be associated with hearing impairment. The seven-item Self Report was included to reflect the hearing impaired child's personal evaluation of his handicap as well as his opinion concerning group awareness of his problems.

In the Social Behavior Trend Index ten dichotomous behavior items, statistically determined to be common denominators underlying good or poor social adjustment, are presented on A and B forms. The A form represents ten items which are designed to represent good adjustment and the B form represents ten items indicative of poor adjustment. The two forms are scored on the basis of their descriptiveness of the student being rated.

Answers to the following questions were obtained from the parent interviews: the child's social behavior in the home, academic progress, social adjustment in the neighborhood and school environment, activity restrictions, parent aspiration-levels, cooperation and agreement in dealing with the handicap, adequacy of the school and home environments in providing for the special needs of the child, the special help and consideration required by the child, and the total effect of hearing loss on behavior. In addition, a 14 item Parent Questionnaire was presented



to the parents of the experimental subjects. These parents were requested to give categorical responses to the questions.

In order to assess the influence of hearing loss on development, social adjustment and personal relationships, a questionnaire of 30 items was presented to parents. Teacher interviews were conducted with oral training instructors, teachers of the hard of hearing, teachers of the retarded, and regular classroom teachers. Such interviews were concerned with the variety of academic and social traits observed in the experimental and control subjects.

The academic achievement tests employed in the special classroom program were the Metropolitan Achievement tests, Gates Primary and Advanced Primary Tests, and the California Achievement Tests. Since time for testing was a limiting factor, the achievement test data available in the schools were accepted for this study. The results of previously administered intelligence tests were also utilized.

Test Scoring. The Sociometric question (best-friend nominations) responses were scored by a method of weighting first, second, and third choices, and considering the total number of times each individual was mentioned. This method was employed since it combined both the commonly used differential weighting-method utilized by Bonney (15, 16, 17) and Price (115), and also the procedure employed by Elser (37), Thorpe (143), and others, and considered only the total number of times mentioned, irrespective of position. A weight of three points for a first choice, two points for a second choice, and one point for a third choice,

or, as in the case of the choices of the mentally retarded group in the cottage units, five points for a first choice, four points for a second choice, etc., was arbitrarily assigned. An individual's score was the sum of his weighted scores plus the sum of the total times he was mentioned. For example, in a situation where three best friend nominations were permitted, an individual received two first choices, four second choices, and two third choices. His total score is the sum of the weighted choices (3, +3, +2, +2, +2, +2, +1, +1) plus 8 (total times mentioned), yielding a total score of 24 points.

The Guess-Who ratings were scored by a percentage method. The total number of mentions received on each item was divided by the number of children in the class. This percentage represented the strength of reputation which the hearing handicapped child had for a given behavioral trait.

The Self-Rating questionnaire was scored by awarding a plus one to a response of "All the Time," a zero to a "Sometimes" response, and minus one to a "Not Very Often" response. The total score for the test was the sum of the scores for the seven items. The highest possible score for the total rating of seven items was plus seven and the lowest score obtainable was minus seven.

The method used in scoring the Social Distance Questionnaire was derived from How To Construct A Sociogram (68). The five categories to which children were asked to assign their classmates were scored from one to five points. The category representing the least social



distance was scored five points and the category representing the greatest social distance was scored one point. A high score represented greater acceptance or less social distance.

The Cowell Social Behavior Trend Index, a rating scale of social behavior completed by teachers and parent substitutes, was scored by computing the algebraic sum for the A form (positive ratings) and the B form (negative ratings) for each of the ten items on both forms. Nine items from the Cowell Social Behavior Trend Index were adopted for use with the mentally retarded experimental and control groups. An item "Markedly" descriptive of a student was scored plus three on the A form and minus three on the B form. A "Somewhat" descriptive rating was scored plus two or minus two, and a rating of "Only Slightly" descriptive was scored plus one or minus one. A "Not At All" rating was scored zero.

Scoring Interview Data. The interview data were scored on a four point scale designed to yield quantitative information. If the response of the informant revealed a markedly negative characteristic for a given question, a score of four points was awarded for that item. A moderately negative tendency was assigned three points, a slightly negative tendency two points, and the absence of the negative trait was assigned one point. A high score was indicative of a marked behavioral deficit whereas a low score revealed a minimum of negative social, academic, and behavioral traits.



Scoring the Parent Questionnaire. Responses to this questionnaire were categorized into one of four groups on the basis of whether the item was "Often True, " "Sometimes True, " "Seldom True, " or "Never True" for the experimental subject. The categories were assigned plus two, plus one, minus one, and minus two points respectively. The total score for the test was the sum of the scores for the fourteen items.

Scoring the Parents' Report. No numerical system was employed in scoring the Parents' Report. Frequency counts for the three categories, "Never, " "Sometimes, " and "Frequently, " were accomplished for each age level ranging from five through seventeen years. Parents' Reports for three experimental subjects and one control subject in the age range 14-17 years were combined. In each of the sociometric tests standard scores were obtained and compared.

#### Method: Public School Program

Preliminary Procedure. The initial step in data collection involved a preliminary meeting with the Superintendent of each school district. The research design was discussed, with special reference to the criteria for selection and identification of subjects and to the proposed test procedure. When the superintendent's approval had been received, subjects were then selected on the basis of audiometric test results and appointments were scheduled with the principals who were to be involved in

making the subjects available. During individual conferences with each principal, the research design was reviewed and assurance of cooperation secured. The previously selected experimental subjects were discussed and directions were provided for selection of the normal hearing control pupils. The principals were then given the required number of parent approval forms (indicating parents' willingness to participate) and questionnaires for the parents of each pupil in the experimental and control groups. A room and test schedule was then arranged.

Selection of Subjects. The experimental group consisted of boys and girls from grades four through seven whose most recent audiometric evaluation had revealed a specific hearing loss configuration. In addition, a history of hearing loss in certain frequencies was required. Only those children who presented a hearing loss near 20 db or greater in one or both ears and at one or more of the frequencies (i.e., 500, 1000, and 2000 cps) were selected to serve as experimental subjects. In order to ensure reliability and validity of the test results, all experimental subjects were required to have demonstrated a consistent loss in the speech frequencies for two or more consecutive hearing evaluations.

For each experimental subject one normal-hearing pupil was randomly selected from the same classroom to serve as his control, by systematically selecting the seventh name down on the class roll. If the selected control pupil was a member of the experimental group, then



the fourteenth, twenty-first, or twenty-eighth name was chosen. In the event of absences, alternate controls were chosen in the same manner. This procedure was used to prevent possible teacher-selection bias.

Test Description. The following tests were employed in the Public School Classroom portion of the study:

1. Pictographic Self-Rating Scale
2. Ammons Full Range Picture Vocabulary Test (Intelligence)
3. Revised Knox Cube Test
4. Cowell Social Behavior Trend Index
5. Academic Achievement Tests (Metropolitan and Stanford)
6. Parent Questionnaire

The above tests, as well as a standard sociometric questionnaire (Guess-Who), were employed in a pilot study. Because some objection was raised to its use, the sociometric questionnaire was subsequently eliminated from the final test battery.

The Pictographic Self Rating Scale is a group-administered test designed to obtain self-report information about a pupil's overall attitude toward his class subject and classroom activity participation. All items are pictorially presented on a five-point negative to positive attitude continuum. For each of the 15 test items, the pupil is directed to circle one of the five pictures best describing how he feels about the given item topic, eg., paying attention in class. The Ammons Full Range Picture Vocabulary test is individually administered and designed to provide an estimate of mental ability. Since this is a performance-type test, it was felt that the use of this instrument would minimize the language handicap possibly resulting from a hearing



impairment and would thus provide more valid comparisons between experimental and control subjects. The test consists of a set of 16 individual cards on which are printed four different pictures. Words assigned to specific cards are presented at a sensation level above threshold and the subject is asked to indicate which picture is associated with the words presented. Testing is completed when three consecutive point-levels are passed and three are failed. Each subject's score, total number of items answered correctly, is then converted to mental age using standardized test norms.

The Revised Knox Cube Test, a sub-test of the Arthur Point Scale of Performance Tests (Revised Form II), provides an estimate of an individual's 'visual' memory span. The test consists of four mounted wooden blocks upon which the experimenter taps a predetermined sequence. The subject is directed, by gestures, to duplicate the tapping order. The test is administered twice, and the final score is the average of the test results for the two administrations.

The Cowell Social Behavior Trend Index, as described earlier, was completed by the classroom teacher. The academic achievement data were taken from Metropolitan or Stanford Achievement Tests, whichever was administered in each of the four school systems. The information was obtained in this manner in accordance with the wishes of the school administrators. The Parent Questionnaire, although not strictly classifiable as a test, provided information relative to background variables as well as estimates of social behavior.

## RESULTS AND DISCUSSION

In the presentation of the results and discussion, the division of the Special Classroom from the Public School program, as presented in the Procedure section, will again be utilized. Three major areas were analyzed: 1) variables generally descriptive of the subject sample; 2) performance on sub-tests classified as measures of behavior; and, 3) performance on sub-tests classified as measures of academic achievement.

### General Descriptive Variables: Special Classroom Program

Descriptive data, characterizing the subjects in each of the Special Classroom programs, were collected and analyzed. This information, obtained from interviews and case-history records, included the following:

1. Sex
2. Chronological Age
3. Age at admission to Special Programs
4. Length of Enrollment in Special Program
5. Age at Diagnosis of Hearing Impairment
6. Handicaps in Addition to Auditory Impairment
7. Hearing Aid Use
8. Attendance at a State School for the Deaf
9. Auditory Impairment in Immediate Family
10. Number of Children in Family
11. Position of Subject in Family
12. Intelligence Quotient
13. Degree of Integration into Regular Classroom



Sex, Age, Length of Enrollment, and Age at Admission. Table 1 shows a summary of the variables of sex, age, length of enrollment and age at admission by program within the special classroom group. Individual data for sex, chronological age, age at diagnosis of hearing impairment, age at enrollment, and length of enrollment by subject are found in Appendix 4.

Table 1

Special Classroom Groups: Comparison of  
Sex, Mean Age, and Mean Enrollment

| Variable                           | Oral Training Center |    | Hard of Hearing Class |    | Class for the Mentally Ret. |   |
|------------------------------------|----------------------|----|-----------------------|----|-----------------------------|---|
|                                    | Males                | 14 | Males                 | 12 | Males                       | 6 |
| Sex                                | Females              | 20 | Females               | 17 | Females                     | 8 |
| Age in years                       | 8.3                  |    | 11.41                 |    | 16.51                       |   |
| Length of Enrollment<br>(in years) | 2.3                  |    | 4.1                   |    | 6.1                         |   |
| Age of Admission<br>(in years)     | 5.9                  |    | 7.1                   |    | 10.4                        |   |

As can be seen in Table 1 the mean age in years, length of enrollment in the special classroom group and the age of admission to the group are smallest for the oral training center subjects, greater for the hard of hearing class subjects and greatest for the mentally retarded group. This was an expected finding, based on the enrollment criteria for each of the programs.

Age of Diagnosis. Table 2 reports the distribution, within two groups, of age of diagnosis of hearing impairment. These data were



obtained from the parent interviews and case histories. A trend reflective of later diagnosis of hearing loss for children enrolled in hard of hearing classes may be seen in these data.

Table 2

Age at Diagnosis of Hearing Impairment

| Program               | 0 - 2<br>years | 2 - 3<br>years | 3 - 4<br>years | 4 years<br>or greater |
|-----------------------|----------------|----------------|----------------|-----------------------|
| Oral Training Center  | 19             | 9              | 3              | 3                     |
| Hard of Hearing Class | 7              | 4              | 3              | 13                    |

Additional Handicaps. Fifteen experimental subjects were found to have handicaps in addition to those characteristic of their respective groups. A subject-by-disorder summary of these additional handicaps is contained in Appendix 5. Eight of these experimental subjects were enrolled in oral training units, four in hard of hearing classes, and three among the state-institutionalized subjects.

Hearing Aid Use. The use of amplification, provided by means of a hearing aid, was found to be most prevalent in the oral training group, with 30 subjects wearing aids. Nineteen children enrolled in the hard of hearing classes employed hearing aids consistently while no mentally retarded subject regularly used one. It was not known to what extent the remaining subjects utilized hearing aids.

Residential School Attendance. Seven experimental subjects, including five enrolled in oral training programs and two enrolled in hard of hearing classes, had attended a residential school for the deaf. Three

experimental subjects from the oral training programs and two experimental subjects from the hard of hearing classes came from families where one or more members of the immediate family had a hearing impairment.

Sibling Data. Data for the number of siblings and sibling position were collected for the subjects in the oral training and hard of hearing classes, the means of which are reported in Table 3. Information for the mentally retarded experimental subjects was incomplete for these two variables. It appears that the two groups, for which data were collected, were not dissimilar with respect to these sibling data.

Table 3

Sibling Data for Subjects in Two Experimental Groups

| Program                 | Mean Number of<br>Children in Family | Mean Position<br>Within Family |
|-------------------------|--------------------------------------|--------------------------------|
| Oral Training Centers   | 3.2                                  | 2.4                            |
| Hard of Hearing Classes | 3.1                                  | 2.3                            |

I. Q. Data. The I. Q. Data obtained for individual subjects are presented in Appendix 6. In lieu of an I. Q. score, the intellectual functioning of several subjects was reported in a descriptive manner, because difficulties in testing associated with the auditory impairment often precluded the completion of an entire intelligence test. Such intellectual evaluation frequently was undertaken simply to provide an indication of whether the child might function successfully in a special education program.



Table 4

## Intelligence Estimates for Experimental Groups

| Program                    | Imbecile<br>25-49 | Moron<br>50-69 | Border-<br>Line<br>70-79 | Low<br>Normal<br>80-89 | Normal<br>90-110 | Superior<br>111-119 | Very<br>Superior<br>120+ |
|----------------------------|-------------------|----------------|--------------------------|------------------------|------------------|---------------------|--------------------------|
| Oral Train-<br>ing Center  | 0                 | 1              | 2                        | 3                      | 25               | 1                   | 1                        |
| Hard of Hear-<br>ing Class | 0                 | 0              | 5                        | 5                      | 14               | 3                   | 2                        |
| Mentally<br>Retarded       | 5                 | 9              | 0                        | 0                      | 0                | 0                   | 0                        |

Table 4 presents group data for estimates of intellectual capacity. Numbers of subjects are shown within each of seven levels of intelligence, arbitrarily defined with respect to intelligence quotient. As expected, the Mentally Retarded Group is in marked contrast to the other two. The modal range for Oral Training Center and Hard of Hearing Class Groups is within the normal range, I. Q. 90-110. A graphical representation of these findings is presented in Figure 6.

Integrated Programs. Table 5 provides further descriptive information about the Oral Training and Hard of Hearing Groups in the Special Classroom section of the study. From the data presented there, it is clear that children in hard of hearing classes spend more time in regular classrooms than children in oral training centers. More individual detail of this nature is presented in Appendix 8.

The bilateral pure tone audiometric test results for the subjects within the special classroom group are reported in detail in Appendix 7



Table 5

## Integrated Program, Data for Experimental Groups

| Program               | Hours Integrated  |          |          | Not Integrated |
|-----------------------|-------------------|----------|----------|----------------|
|                       | Two Hours or Less | Half Day | Full Day |                |
| Oral Training Center  | 8                 | 3        | 0        | 23             |
| Hard of Hearing Class | 7                 | 0        | 20       | 2              |

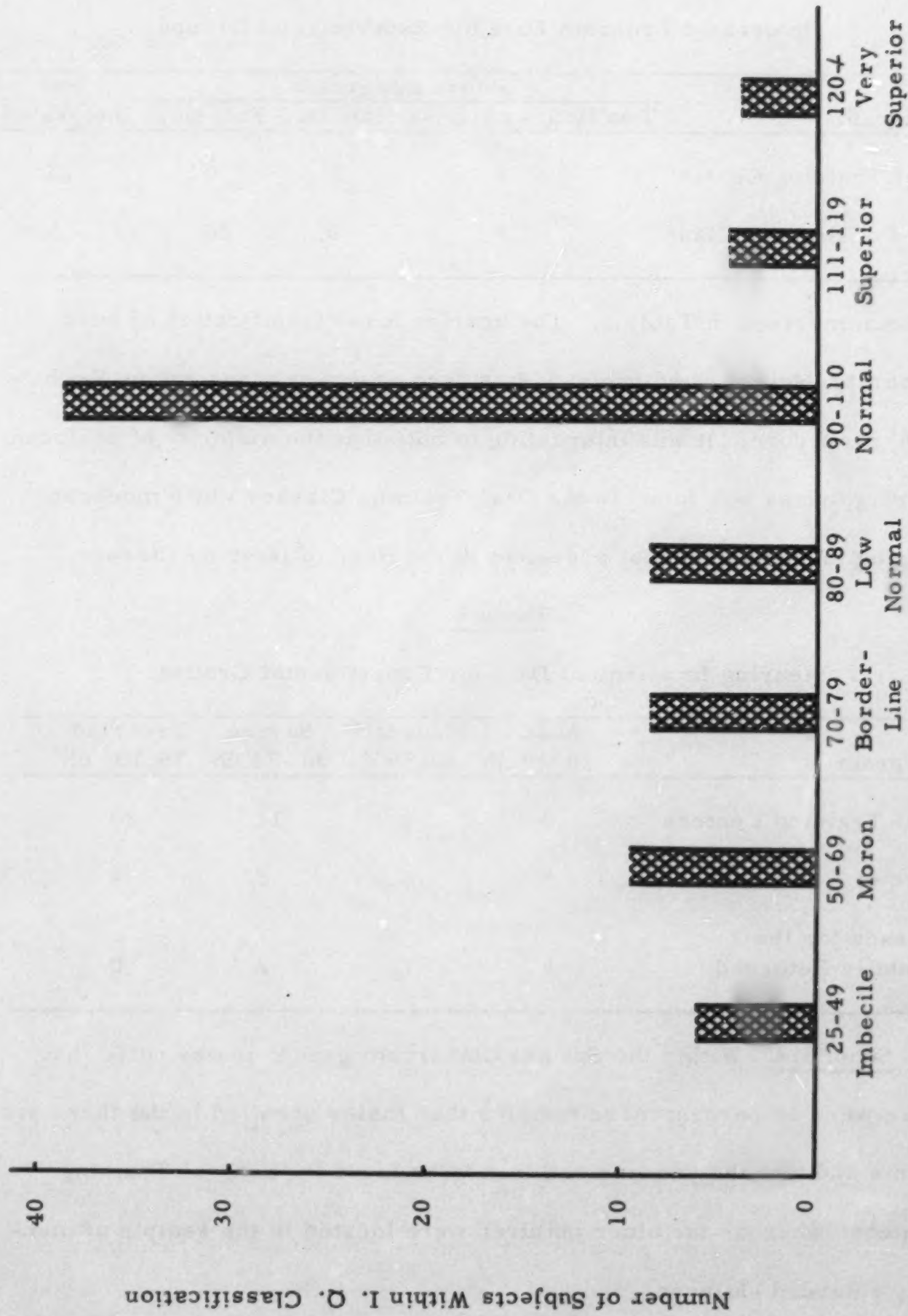
and summarized in Table 6. The hearing loss classification of mild, moderate, severe, and profound has been assigned according to Newby's (105) procedure. It was interesting to note that the majority of profound hearing losses was found in the Oral Training Classes while moderate hearing losses were most prevalent in the Hard of Hearing Classes.

Table 6

## Hearing Impairment Data for Experimental Groups

| Program                           | Mild     | Moderate | Severe   | Profound  |
|-----------------------------------|----------|----------|----------|-----------|
|                                   | 20-39 db | 40-59 db | 60-74 db | 75-100 db |
| Oral Training Centers             | 0        | 2        | 12       | 20        |
| Hard of Hearing Classes           | 5        | 14       | 6        | 4         |
| Classes for the Mentally Retarded | 5        | 7        | 2        | 0         |

Summary. Within the Special Classroom group, it was noted that there were 16 percent more females than males enrolled in the three programs and that the younger children were found in the Oral Training Centers, whereas the older children were located in the sample of mentally retarded children.



## I. Q. Scores and Description

Figure 6. Intelligence Estimates for Special Classroom Subjects



It was also noted that, not only was there a two year mean difference in age of admission into the Oral Training Centers versus the Hard of Hearing Classes, but there is also the same two year difference between these two groups in the age at which the diagnosis of a hearing impairment is made. In addition, although the younger children were found in the Oral Training Centers, these subjects had a greater number of severe hearing losses than the other two groups. The Hard of Hearing group subjects had more moderate losses than the Oral Training Center or Mentally Retarded groups.

Among other factors studied, the following were noted: 1) the use of hearing aids was most prevalent in the Oral Training Center group; 2) only 12 of the 77 subjects in the Special Classroom Program had attended a residential school for the deaf or had a familial history of hearing loss; 3) no outstanding differences were found between groups with respect to number of siblings or rank within sibling group.

#### General Descriptive Variables: Public School Program

In the Special Classroom Program, the subjects had been placed in their respective groups by reason of age, inability to succeed in a completely normal hearing environment, intelligence, hearing aid use, and the presence of handicaps in addition to hearing impairment. The analysis of the descriptive data derived from these subjects was found to be most meaningful when examined by means of within-group comparisons.

In the Public School Program, the subjects were selected from grades four through seven on the assumption that the pupils in these grades would represent an important cross-section of elementary school children. Furthermore, it was considered that the behavioral and academic problems which may have resulted from varying degrees of hearing impairment are likely to have made their appearance prior to the fourth grade and therefore, to have been established in the grades here sampled. The subjects thus selected were categorized according to age, race, sex, grade, and according to five monaural and four binaural levels of hearing losses. Descriptive data related to the hearing impairments are presented in Appendix 8. The data derived from selected descriptive variables were treated through experimental-control subject comparisons.

The background variables submitted for analysis were the following: parental occupation\*, age, and the highest school grades attained. In

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\* The classification system for parent occupation in this study is basically the seven point classification suggested by Goodenough and Anderson (Goodenough, F. L., and Anderson, J. E., Experimental Child Study, New York: Century, 1931) with the addition of the "housewife or unemployed father" category:

1. Professional
2. Semi-Professional, Managerial
3. Clerical, Skilled Trades, Retail Business
4. Farmer
5. Semi-skilled, Minor clerical, Business
6. Slightly skilled
7. Day Laborer
8. Housewife or Unemployed Father



the collection of background data descriptive of the sample drawn, a questionnaire was submitted to the parents of all experimental and control subjects. The resultant information was coded and card punched utilizing IBM methods. Additional information included the number of siblings in each subject's family, his rank within the family group, and the number of schools which he had attended.

Parent Occupation. It can be seen in Figure 7 that the distributions of mothers' occupations within the eight categories are very similar for both experimental and control samples. Three mothers of experimental subjects were within the professional classification -- doctors, lawyers, or similar occupations -- while four mothers of control subjects were included in this classification. In both groups the largest single category was category 8 - housewife. Figure 8 shows the occupational distribution for fathers of experimental and control subjects. As was found for the mothers, analysis of the fathers' occupations showed only small differences between experimental and control samples. The eighth category in this figure represents unemployed fathers.

Parent Chronological Age. Examination of age data in experimental and control samples revealed that the mean ages of the mothers of experimental and control subjects were 36.40 years and 36.94 years, respectively. For the male parents the ages were 35.32 years and 37.76 years.

Parent Highest Grade. In the comparison of highest school grades attained by the mothers and fathers of the Public School group, each parent was classified according to the educational categories suggested

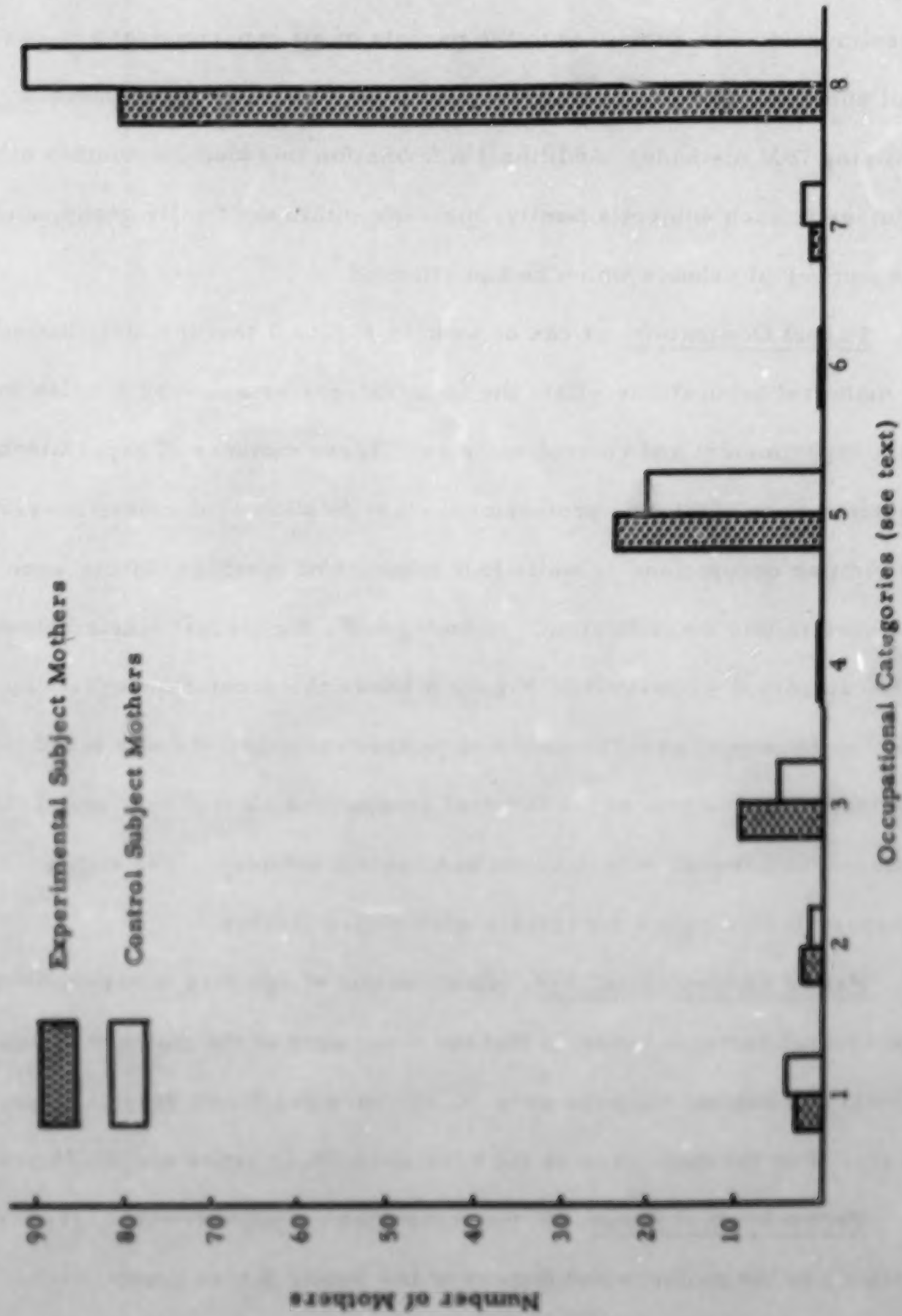


Figure 7. Distribution of Maternal Occupations: Public School Program



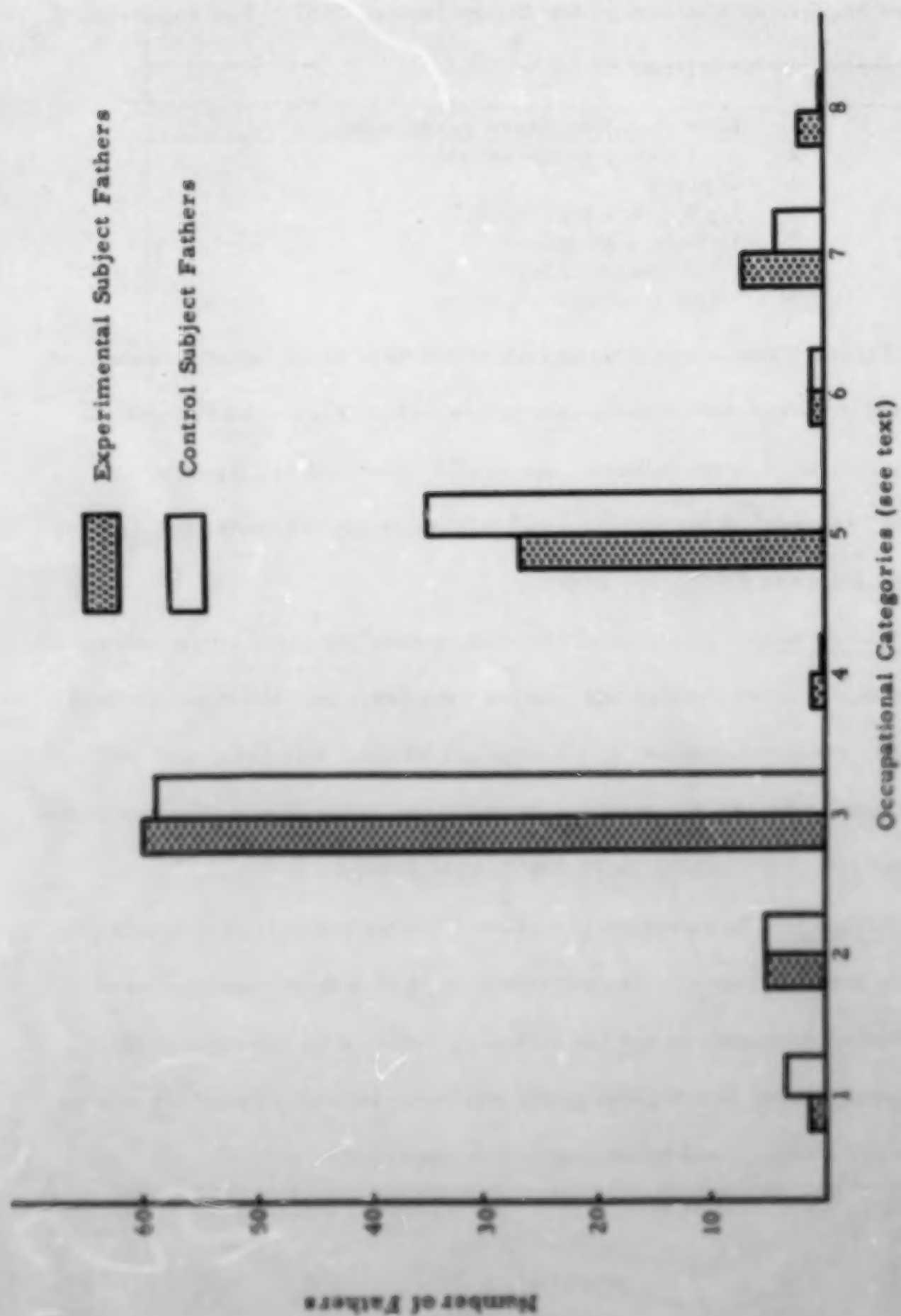


Figure 8. Distribution of Paternal Occupations: Public School Program

in the Statistical Abstract of the United States, 1957. The suggested categories are as follows:

1. Less than five years grade school
2. 5 - 7 years grade school
3. Grade 8
4. 1 - 3 years high school
5. 4 years high school
6. 1 - 3 years college
7. 4 years college or more

Figure 9 shows the distribution of mothers of the experimental and control subjects within these categories, while Figure 10 reports the same information for fathers. As can be seen in these figures, the modal frequencies for mothers and fathers of experimental and control subjects appear to be very similar.

Sibling Data. Analysis of the sibling data indicated little difference between the experimental and control samples. For example, in both groups, the mean number of siblings per subject was four, and both experimental and control children were second in mean position, by chronological age, within their individual family groups.

Summary. In summary the above findings indicate that within the Public School Program, the experimental and control samples were comparable when examined for the following selected variables: parent occupation, age, and highest grade attained, as well as number of siblings per subject, and mean position in the family.

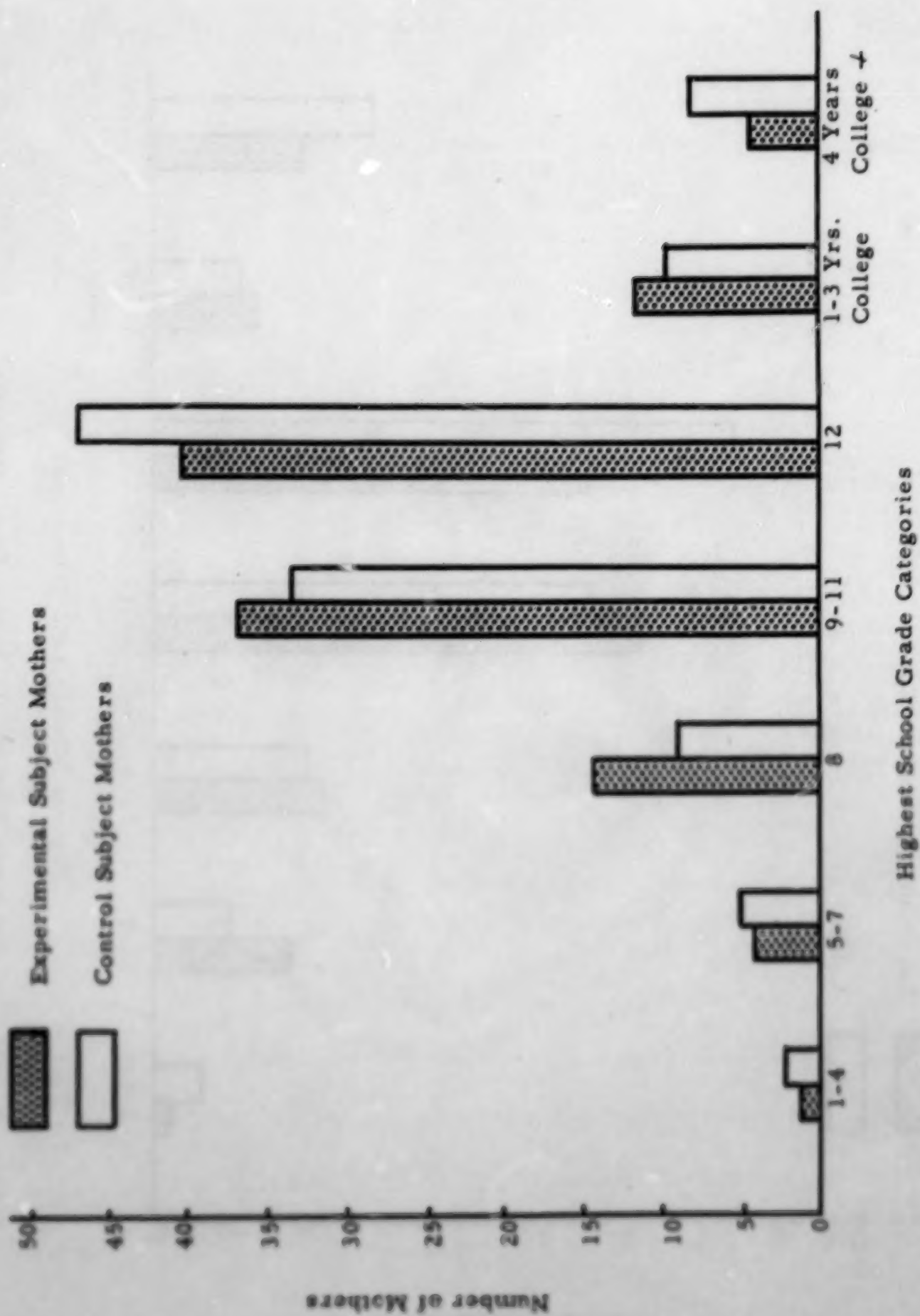


Figure 9. Maternal Academic Attainment: Public School Program



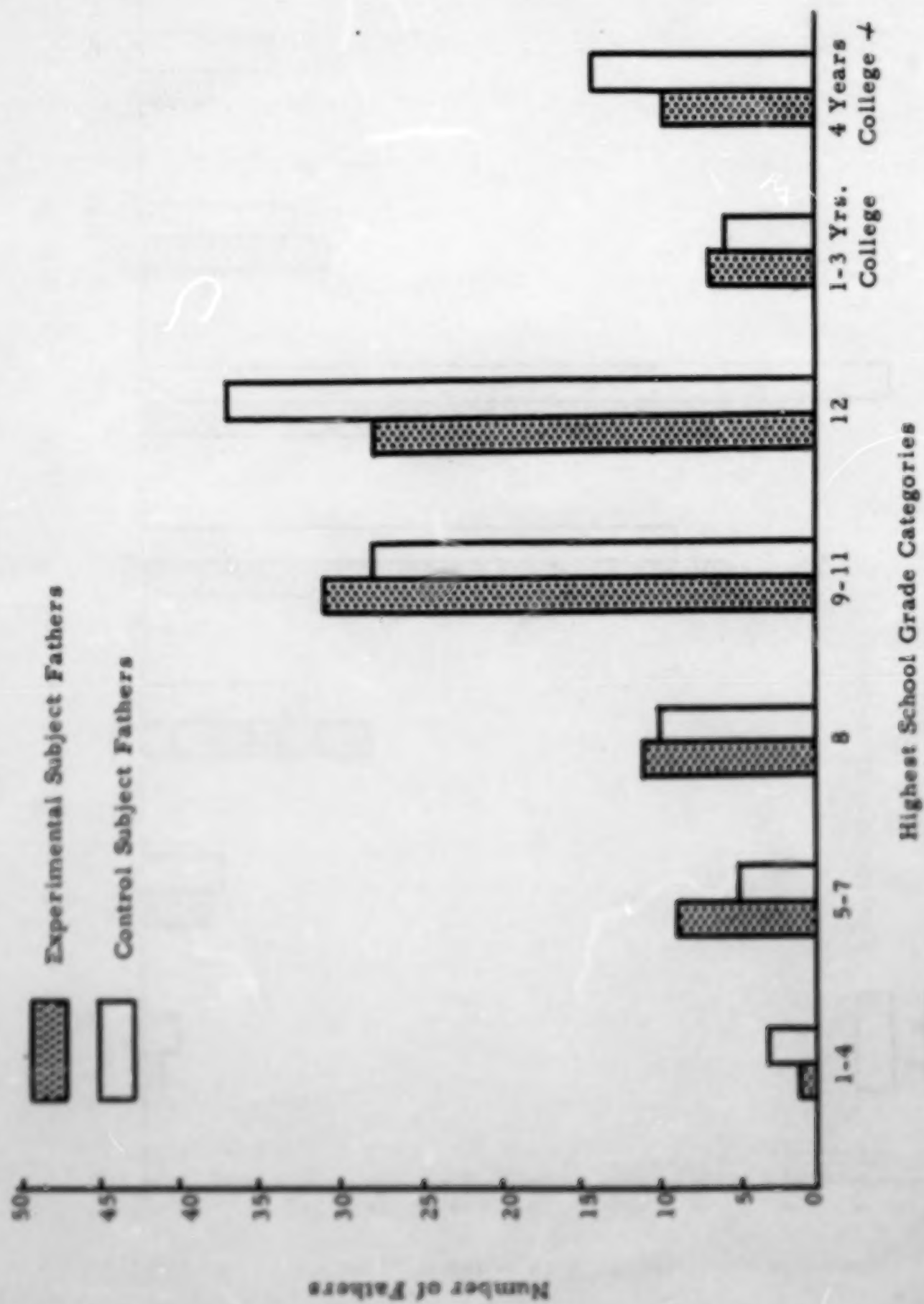


Figure 10. Paternal Academic Attainment: Public School Program

### Behavioral and Academic Variables: Special Classroom Program

The measures of behavioral and academic performance applied to subjects in the Special Classroom Program were listed previously under Test Description. Copies of the forms used for the collection of these data are in Appendix 9.

In the application of the behavioral measures to the three groups within the Special Classroom Program, it was found that the Social Distance Questionnaire, Guess-Who Questionnaire, and Self Report were too difficult for many of the younger children in the Oral Training Centers and the majority of the children in the Classes for Mentally Retarded. Some data were unobtainable through inability of subjects to complete the tests. Table 7 shows the number of subjects within various groups who were administered selected behavioral measures.

Table 7

Number of Subjects by Group for Five Behavioral Measures

|                         | <u>Sociometric<br/>Questionnaire</u> | <u>Social<br/>Distance</u> | <u>Social<br/>Behavior</u> | <u>Self<br/>Report</u> | <u>Guess<br/>Who</u> |
|-------------------------|--------------------------------------|----------------------------|----------------------------|------------------------|----------------------|
| Oral Training Center    | 34                                   | 10                         | 34                         | 9                      | 10                   |
| Hard of Hearing Class   | 29                                   | 29                         | 29                         | 28                     | 29                   |
| Mentally Retarded Class | 14                                   | 0                          | 14                         | 0                      | 0                    |

Sociometric Questionnaire. In the analysis of the Sociometric Questionnaire, the total score obtained for each subject was the sum of his weighted scores plus the sum of the total times he was mentioned by

his classmates. The total scores were then converted into standard scores within specific class groups (e.g., the Fort Wayne Oral Training Center) and then summed over all Special Classroom groups-Oral Training Center, Hard of Hearing Classes, and Class for Mentally Retarded. Whenever possible, sociometric measurements were also collected and analyzed for both integrated and special classrooms.

Table 8 reports the mean standard scores calculated for main groups and sub-groups in the Special Classroom Program.

Table 8

Special Classroom Program: Mean Standard Scores for the  
Experimental Subjects for the Sociometric Questionnaire

| Group                                 | Special Classroom | Regular Classroom |
|---------------------------------------|-------------------|-------------------|
| <u>Oral Training Centers (N=34)</u>   |                   |                   |
| Ft. Wayne                             | .00               | .91               |
| Muncie                                | .27               | --                |
| South Bend                            | .00               | -.44              |
| Average                               | .09               | .16               |
| <u>Hard of Hearing Classes (N=29)</u> |                   |                   |
| Muncie                                | .35               | -.26              |
| Evansville                            | -.37              | -1.08             |
| South Bend                            | -.28              | -.42              |
| Average                               | -.10              | -.59              |
| <u>Mentally Retarded Class (N=14)</u> |                   |                   |
| Ft. Wayne                             | .54               | -.04              |

As may be seen in Table 8, the average standard score for the Hard of Hearing subjects in the regular classroom at Evansville is the only



score which deviated more than one standard score from the mean value for the entire group. A trend is noted for experimental subjects to receive lower sociometric scores in regular versus special classes.

The sociometric data were then reclassified according to hearing loss criteria described earlier. Standard scores and deviations obtained for the four hearing loss groups appear in Table 9.

Table 9

Special Classroom Program: Comparison of Mean Standard Scores and Deviations for the Experimental Subjects for Four Hearing Loss Classifications and Three Behavioral Measures

| Hearing Loss Classification | Type of Classroom | Sociometric |       | Social Distance |       | Self Report |       |
|-----------------------------|-------------------|-------------|-------|-----------------|-------|-------------|-------|
|                             |                   | Mean        | S. D. | Mean            | S. D. | Mean        | S. D. |
| Mild                        | Special           | .25         | .91   | .98             | .66   | .73         | .69   |
|                             | Regular           | -.84        | .73   | 1.00            | .94   | -.14        | .84   |
| Moderate                    | Special           | .22         | 1.09  | .55             | .94   | .12         | 1.12  |
|                             | Regular           | -.18        | 1.01  | .82             | .93   | -.56        | 1.24  |
| Severe                      | Special           | -.09        | .86   | .15             | .47   | -.04        | .83   |
|                             | Regular           | -.15        | .72   | .84             | 1.05  | .55         | 1.29  |
| Profound                    | Special           | .18         | 1.14  | .26             | 1.51  | .62         | .89   |
|                             | Regular           | -.27        | .87   | --              | --    | -1.25       | 1.23  |

In an examination of Table 9 it would appear that subjects of all hearing loss categories integrated in regular classrooms displayed a definite trend toward lower mean standard score values. From this observation, the tentative interpretation is that the experimental subjects in the Special Classroom Program are less popular and are mentioned fewer times as friends in the regular classroom than in their special classroom environments.

Social Distance Questionnaire. In the scoring of the Social Distance values, the mid-point (2.5) of the five point scale was utilized as the mean or zero standard score value. Entries in Table 9 are deviations from this mid-point. As conventionally interpreted, the higher the score attained by a subject on this measure, the more acceptance or less social distance evidenced. As can be seen in Table 9 all experimental subjects attained social distance values above the mid-point of the range (no negative entries in the table). However, as hearing loss classification rose from mild toward profound there was an apparent reduction in social acceptance - a finding of dubious significance, considering the limited range within which it occurred. It is to be noted that, because of the heterogeneity of the subject sample, tests of statistical significance were considered inappropriate. Finally, it would appear that the experimental subjects find social acceptance in the integrated as well as in the special classrooms.

Self Report Questionnaire. The Self Report appeared to be the least stable of the behavioral measures. No noteworthy differences were revealed in item analyses. The frequency of responses within the three possible choices for each of the seven items was evenly distributed for all experimental subjects who responded to this questionnaire. In Table 9 there is no discernible trend in the standard score values. Hence, any interpretation of these data would be untenable.

Guess-Who Questionnaire. The Guess-Who Questionnaire is a technique for the identification of persons with given traits of personality



or behavior. When the data for this study were collected it was of interest to the experimenters to discover, first of all, how many experimental subjects were categorized under the various headings of the 12 items comprising the scale. Second, calculation of percentages made possible further interpretation of the data. For example, it was interesting to learn that 17 experimental subjects received mention in integrated classrooms under category 6 (Table 11) - indicative of uncommunicativeness; it was more interesting to consider that 74% of the experimental subjects in integrated classes were so categorized. Tables 10 and 11 summarize the numerical count and percentage data collected in the Guess-Who ratings. Specific item categorizations are to be found in Appendix 9.

Table 10

Comparison of Oral Training and Hard of Hearing Classes:  
Subjects Mentioned by items in Guess-Who Questionnaire

| Item<br>Question | No. of Exp. Subjects             |                                    | Percent of Exp. Subjects         |                                    |
|------------------|----------------------------------|------------------------------------|----------------------------------|------------------------------------|
|                  | Oral Train.<br>Classes<br>(N=22) | Hard of Hear.<br>Classes<br>(N=18) | Oral Train.<br>Classes<br>(N=22) | Hard of Hear.<br>Classes<br>(N=18) |
| 1                | 0                                | 3                                  | 0                                | 17                                 |
| 2                | 13                               | 15                                 | 60                               | 83                                 |
| 3                | 9                                | 11                                 | 40                               | 61                                 |
| 4                | 0                                | 1                                  | 0                                | 6                                  |
| 5                | 0                                | 2                                  | 0                                | 11                                 |
| 6                | 18                               | 13                                 | 80                               | 72                                 |
| 7                | 4                                | 2                                  | 20                               | 11                                 |
| 8                | 4                                | 10                                 | 40                               | 56                                 |
| 9                | 0                                | 3                                  | 0                                | 17                                 |
| 10               | 13                               | 8                                  | 60                               | 44                                 |
| 11               | 20                               | 12                                 | 90                               | 67                                 |
| 12               | 4                                | 2                                  | 40                               | 11                                 |



Table 11

Comparison of Integrated and Special Classes:  
Subjects Mentioned by Items in Guess-Who Questionnaire

| Item<br>Question | No. of Exp. Subjects            |                              | Percent of Exp. Subjects        |                              |
|------------------|---------------------------------|------------------------------|---------------------------------|------------------------------|
|                  | Integrated<br>Classes<br>(N=23) | Special<br>Classes<br>(N=31) | Integrated<br>Classes<br>(N=23) | Special<br>Classes<br>(N=31) |
| 1                | 3                               | 13                           | 13                              | 42                           |
| 2                | 18                              | 17                           | 78                              | 55                           |
| 3                | 14                              | 15                           | 61                              | 48                           |
| 4                | 1                               | 14                           | 4                               | 45                           |
| 5                | 2                               | 17                           | 9                               | 55                           |
| 6                | 17                              | 14                           | 74                              | 45                           |
| 7                | 3                               | 12                           | 13                              | 39                           |
| 8                | 12                              | 18                           | 52                              | 58                           |
| 9                | 3                               | 12                           | 13                              | 39                           |
| 10               | 11                              | 17                           | 48                              | 55                           |
| 11               | 17                              | 18                           | 74                              | 58                           |
| 12               | 4                               | 16                           | 17                              | 52                           |

In addition to Item 6, Items 2 and 11 apparently were most descriptive of the experimental subjects. The Guess-Who questions for the two items described the experimental subjects as being silent, quiet and possessing problems that would make school a little difficult at times. A descriptive characteristic of the younger experimental subjects found in the Oral Training Centers was that they did not have any bad habits or mannerisms as shown by Item 10.

The results of the Guess-Who Questionnaire tended to reveal that the judgments obtained in the integrated classrooms were less consistent over all items than the judgments in special classrooms. In the Guess-Who procedure, the judgments are made by other students in the class.

Social Behavior Trend Index. The Social Behavior Trend Index was scored by algebraically summing the positive (Form A) and negative (Form B) ratings for each of the 10 items. These scores were combined to provide the total Index score. Comparisons of total rating scores assigned to subjects were made between regular classroom teachers vs. special classroom teachers for the Oral Training Center pupils, and between regular classroom teachers vs. special classroom teachers for hard of hearing pupils. These comparisons were made utilizing the Mann-Whitney U Test and the results are presented in Appendix 10. The findings would indicate that the experimental subjects in both the Oral Training Centers and special classes for the hard of hearing were rated significantly different by regular classroom teachers than by teachers of their special classrooms. The trend was toward a lower positive rating by the regular classroom teachers.

Similar comparisons were made between these teacher ratings for the subject groups in terms of the individual items on the Social Behavior Trend Index. In this analysis, a graphically derived median rating value (50th percentile) was determined for each item in relation to subject group and teacher category. These results, including associated variability estimates (Q values), are indicated in Appendix 11.

It can be seen in Appendix 11 that special teachers rated pupils in the Oral Training Units toward the more positive end of the rating continuum than did the regular classroom teachers; however, the median scale value of all but one of the items fell within the positive range of

the rating continuum. A slight tendency was noted by the special classroom teachers for the hearing impaired pupils to lack self-confidence and initiative and to be a follower.

Similar trends were noted when the item ratings of hard of hearing pupils by regular and special teachers were compared. Again, the special teachers did not rate the pupils negatively on any Index items while the regular teachers did so for two items. These ratings indicated that the aurally handicapped pupils were considered to show a slight tendency to be secretive, exclusive and not inclined to talk unless spoken to, and to lack self-confidence and initiative. Because of the large variability associated with the item ratings by the teachers in both the Oral Training Center Units and special classes for the hard of hearing pupils, the above results must be considered tentative. However, certain consistent trends, noted above, were observed in the data.

Parent Questionnaire. Only parents of subjects in the Oral Training Centers and Hard of Hearing Classes were asked to respond to the Parent Questionnaire. When these data were examined, it was seen that the items on the Questionnaire, involving withdrawal of the subject from active group participation and from social contacts with the immediate family as well as outsiders, were given the greatest number of "Never True" responses by the parents of Oral Training Center subjects. The items having the greatest number of "Often True" responses by the same parents were those involving a need by the subject



for approval from the parents and items reflective of the fact that persons tended to speak louder and use more gestures when they realized the subjects had a hearing loss.

The greatest number of "Never True" responses obtained from the parents of the Hard of Hearing Class subjects was for the item involving worries by the subjects about saying the correct things to please his parents and for the item specifying that the parents thought they had less fun with their children because of the hearing loss. The items most frequently noted as "Often True" by the Hard of Hearing parents were those showing the need of parent approval, a tendency for the subject to interrupt conversation, and the parent's belief that many of the problems which the subjects had were based upon his hearing loss. It is also interesting to note that the greatest number of responses were obtained in the "Never True" category for both parent groups, as seen in Figure 11. The number of responses per item for the Parent Questionnaire is given in Appendix 11b.

Academic Testing. The Gates Primary Reading Test was used for the academic skill estimate for the early elementary group, while the Gates Advanced Primary Test was used for the intermediate elementary group. The former has word recognition, sentence reading, and paragraph reading subtests, while the latter consists of word recognition and paragraph reading subtests. The elementary and junior high editions of the California Achievement Test were employed for the older experimental subjects who had received instruction in academic subjects.

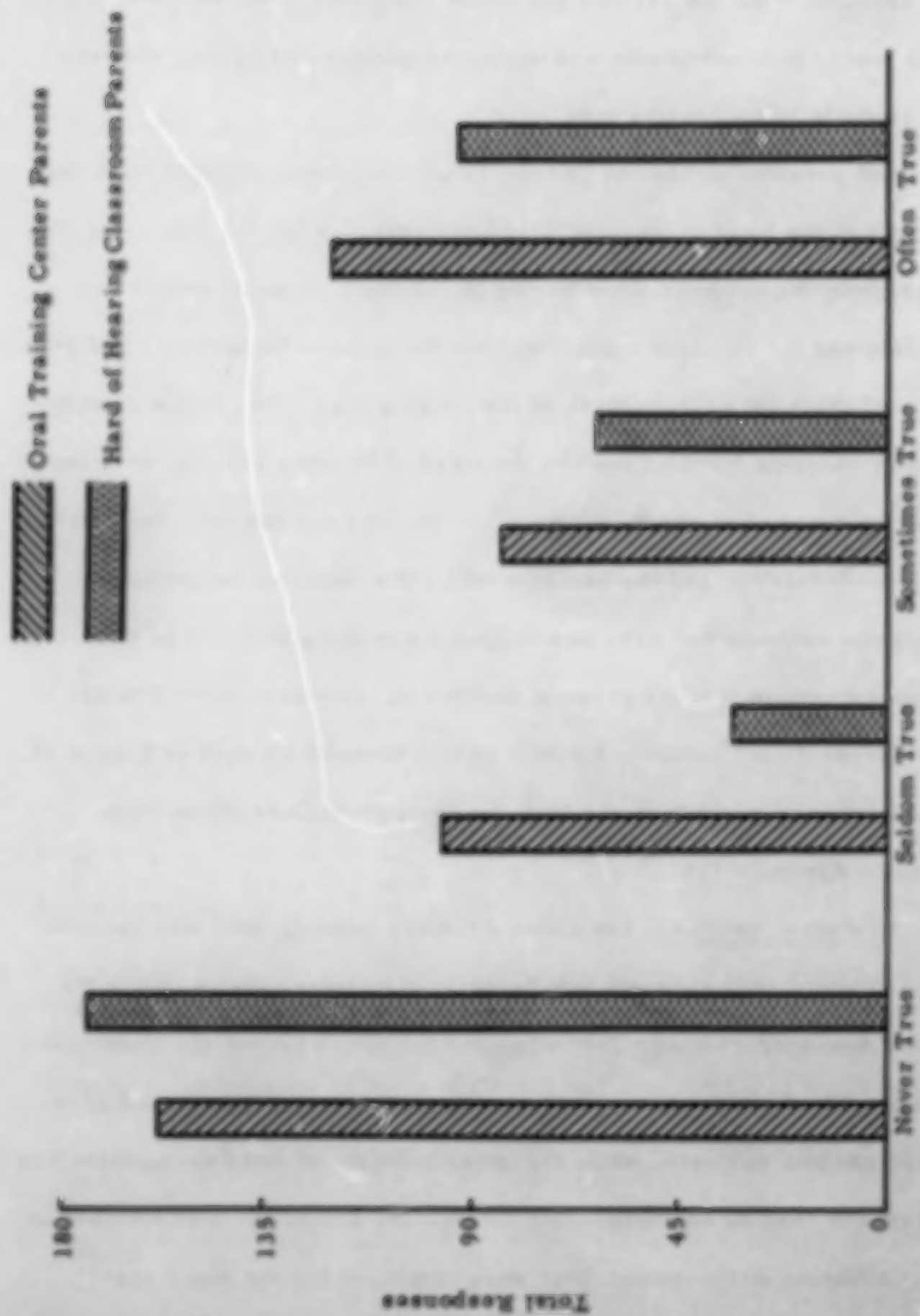


Figure 11. Distribution of Parent Responses to Parent Questionnaire Items

Subtests included in the California Achievement Test were reading vocabulary, reading comprehension, arithmetic reasoning, arithmetic fundamentals, mechanics of English, spelling, and totals for reading, arithmetic and language, as well as a total score for the entire battery.

Selected academic tests and the number of experimental subjects tested within each program are shown in Table 12.

Table 12

Experimental Subjects: Summary of Tests, Programs, and Pupils

| Program                              | Gates<br>Primary | Gates<br>Advanced | Calif.<br>Primary | Calif.<br>Advanced | No<br>Test |
|--------------------------------------|------------------|-------------------|-------------------|--------------------|------------|
| Oral Training<br>Center              | 15               | 8                 | --                | --                 | 11         |
| Hard of Hearing<br>Classes           | 6                | 9                 | 8                 | 6                  | 0          |
| Classes for the<br>Mentally Retarded | 6                | 3                 | --                | --                 | 5          |

The age score derived from the test given to an individual subject was compared to his actual chronological age at the time of test administration; the deviation, expressed in months, provided an index of academic retardation. An index of academic retardation by hearing loss levels derived from both the California Achievement tests and the Gates Reading tests is given in Table 13.

An interesting trend revealed that academic retardation was inversely associated with severity of the hearing loss. A factor which might account for this trend was a greater number of mentally retarded



subjects within the mild and moderate hearing loss classifications. This is particularly mirrored in the large standard deviation obtained for the mild hearing loss group (Table 13).

Table 13

**Experimental Subjects: Academic Retardation Data**

| Hearing Loss Level | Mean Retardation<br>(in months) | Standard Deviation |
|--------------------|---------------------------------|--------------------|
| Mild Loss          | 21.8                            | 18.2               |
| Moderate Loss      | 20.5                            | 5.7                |
| Severe Loss        | 13.0                            | 10.4               |
| Profound Loss      | 12.2                            | 6.5                |

Based upon the academic test results, Table 14 shows the grade placement of subjects within the three Special Classroom groups based upon the normative data obtained.

Table 14

**Experimental Subjects: Grade Placement Level**

| Group                 | Below<br>Grade Level | Proper<br>Grade Level | Above<br>Grade Level |
|-----------------------|----------------------|-----------------------|----------------------|
| Oral Training Centers | 22                   | 0                     | 1                    |
| Hard of Hearing Class | 21                   | 1                     | 7                    |
| Mentally Retarded     | 9                    | 0                     | 0                    |

The results of the grade placement analysis show that subjects in the Special Classroom Program were significantly below the grade level placement of normal hearing children.

### Behavioral and Academic Performance: Public School Program\*

The measures of behavioral and academic performance used in the Public School Program segment of this investigation were the following:

1. Cowell Social Behavior Trend Index
2. Parent Questionnaire
3. Pictographic Self Rating Scale
4. Revised Knox Cube Test
5. Intelligence Data
6. Academic Achievement and Classroom Performance

Cowell Social Behavior Trend Index. As a result of the matching of experimental and control subjects in the Public School Program segment of the study, it was possible to evaluate the obtained differences for levels of statistical significance. Among the data so tested were those collected by administration to all subjects of Forms A and B of this Index. Table 15 shows intra-rater reliability estimates for Forms A and B of the Index for specified groups. As an aid in interpreting the results of this measurement, it must be stressed that the ratings were made by a large sample of teachers and for 10 items within each test form. It can be seen that all coefficients were significantly different from a correlation of zero. For these reasons, it is

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\* Before behavioral and academic performance data were subjected to statistical analysis, a Bartlett test for homogeneity of variance was made for five variables: chronological age, Pictographic Self Rating Scale, Mental Age, Intelligence Quotient, and the Knox Cube results. Figure 12 shows the results of the Bartlett test, in which an F-value of 7.82 was required for significance at the five per cent level. Only one measure -- age, in the experimental group -- was found lacking in homogeneity of variance, a finding which was expected.

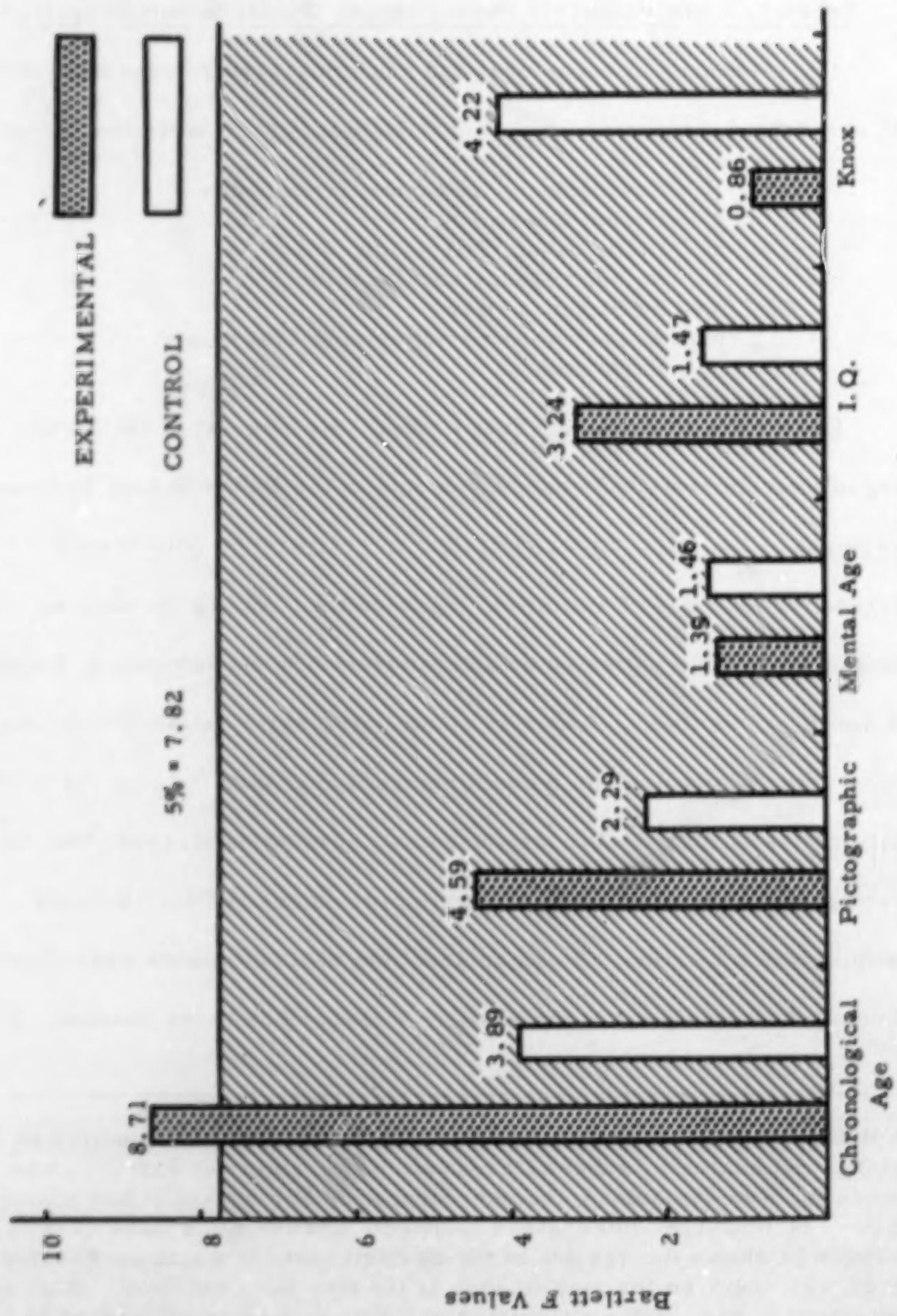


Figure 12. Bartlett Test Results for Public School Program



considered that the reliability is reasonably acceptable for the purposes of this study. Of interest is the finding that the experimental subjects were rated more reliably than the controls and that the ratings of the binaural subjects were more consistent than those for subjects with a monaural type of hearing loss. The latter result may be consistent with the observation that children with monaural hearing losses, unless quite extensive, may be perceived as having normal hearing while children with binaural losses are more readily identified and perhaps receive greater attention. There are, of course, other factors which may contribute to the obtained results.

Table 15

Public School Program: Group Intra-Rater Reliability Coefficients  
for Forms A and B of the Cowell Social Behavior Trend Index

| Group                 | r   | df  | Significance* |
|-----------------------|-----|-----|---------------|
| Total Experimental    | .71 | 141 | .01           |
| Total Control         | .63 | 141 | .01           |
| Monaural Experimental | .51 | 74  | .01           |
| Binaural Experimental | .73 | 65  | .01           |

\* Tabled values:  $r_{.01}(df=150) = .208$ ;  $(df=70) = .302$ .

The differential "adjustment" score, as indicated earlier, is derived by algebraically summing the scores of the two forms. The relation between these Index scores for experimental and control subjects was estimated by correlation methods. The resultant coefficient,  $-.12$  ( $df=284$ ),

clearly indicates a lack of reliable relation between the scores of the two groups. A further analysis of the Cowell Social Behavior Trend Index data is summarized below in Table 16.

Table 16

Public School Program: Cowell Social Behavior  
Trend Index Comparisons by Median Test Technique

| Groups                                        | df | Chi-Square | Significance* |
|-----------------------------------------------|----|------------|---------------|
| Total Experimental vs.<br>Total Control       | 1  | 5.00       | .05           |
| Monaural Experimental vs.<br>Monaural Control | 1  | .81        | ns            |
| Binaural Experimental vs.<br>Binaural Control | 1  | 12.93      | .01           |

\* Tabled values:  $X^2_{.05}(df=1) = 3.84$ ;  $X^2_{.01}(df=1) = 6.64$

For this analysis, the median rating of each of the 10 items (forms combined) was graphically determined for all subjects within the groups selected for comparison, and subsequently analyzed by the Median Test\*. The results indicate that experimental and control subjects differ significantly in central tendency. In the sub-analyses, the binaural hearing loss subjects differed significantly from their controls while this was not true for the monaural groups. Insofar as the Cowell Social Behavior Trend Index validly reflects social adjustment, it would appear that pupils with binaural hearing losses are less well adjusted than their normal hearing classmates as judged by teachers' ratings.

\* Siegel, Sidney, Nonparametric Statistics For The Behavioral Sciences. New York: McGraw-Hill, 1956, 111-116.



Parent Questionnaire. School officials distributed the Questionnaire to parents of both experimental and control subjects with instructions to return the completed forms to the school office. Eighty-three percent of the 300 questionnaires were returned. Of the data available in the Parent Questionnaire, Part I was amenable to statistical analysis. The distribution of Item responses obtained from parents of the experimental and control groups is given in Appendix 13. Each child was judged by his parents, on a four-point scale, relative to nine specific types of behavior (see page 161). Table 17 summarizes the results of the group comparisons for these data.

Total Groups. The results in Table 17 indicate that most parental ratings of control and experimental subjects differed significantly. In comparison to the control subjects, the following tendencies were judged to be characteristic of the children having hearing losses: 1) are less frequently popular with other boys and girls; 2) frequently strain to hear persons talking; 3) seem less frequently interested in conversation; 4) more frequently tire easily or appears restless; 5) less frequently understand other children when playing; and, 6) more frequently play the radio or TV too loudly.

It should be noted that, in these and subsequent comparisons, one or more adjacent rating-scale response categories were combined to meet the assumptions underlying the statistical test.

Monaural Group. In comparison to their control group, the monaural hearing loss subjects were judged to display the following behavioral



Table 17

Public School Program: Parent Questionnaire Chi-Square Comparisons  
re Nine Behavioral Characteristics of Experimental Subjects  
(Expected frequencies derived from control sample)

| Item** | Groups                | N <sub>obs.</sub> | Chi-Square | df | Significance |
|--------|-----------------------|-------------------|------------|----|--------------|
| 1      | Total Experimental    | 117*              | 11.95      | 2  | .01          |
|        | Monaural              | 64*               | .93        | 2  | ns           |
|        | Binaural              | 53                | 6.75       | 2  | .05          |
| 2      | Total Experimental*** | --                | --         | -- | --           |
|        | Monaural              | 62                | 22.41      | 1  | .01          |
|        | Binaural              | 55*               | 1.74       | 2  | ns           |
| 3      | Total Experimental    | 116               | 139.24     | 2  | .01          |
|        | Monaural              | 63*               | 79.61      | 1  | .01          |
|        | Binaural              | 54*               | 40.58      | 2  | .01          |
| 4      | Total Experimental    | 117*              | 3.20       | 3  | ns           |
|        | Monaural              | 63*               | 11.34      | 3  | .01          |
|        | Binaural              | 55*               | .16        | 2  | ns           |
| 5      | Total Experimental    | 119*              | 9.70       | 2  | .01          |
|        | Monaural              | 65*               | .35        | 2  | ns           |
|        | Binaural              | 54*               | 17.77      | 2  | .01          |
| 6      | Total Experimental    | 118*              | 13.39      | 3  | .01          |
|        | Monaural              | 64*               | 19.26      | 2  | .01          |
|        | Binaural              | 54                | 1.25       | 2  | ns           |
| 7      | Total Experimental*** | --                | --         | -- | --           |
|        | Monaural              | 63                | 73.93      | 2  | .01          |
|        | Binaural              | 51                | .13        | 2  | ns           |

\* Frequencies adjusted for unequal Ns.

\*\* Items: 1) Is popular with other boys and girls; 2) Misunderstands instructions; 3) Strains to hear person talking; 4) Watches face of speaker closely; 5) Seems interested in conversation; 6) Seems restless or tires easily; 7) Angers easily; 8) Understands other children when playing; 9) Plays radio or TV too loud.

\*\*\* Sample interactions prohibited overall comparison.

Table 17 (Continued)

| Item** | Groups             | N <sub>obs.</sub> | Chi-Square | df | Significance |
|--------|--------------------|-------------------|------------|----|--------------|
| 8      | Total Experimental | 118*              | 81.80      | 2  | .01          |
|        | Monaural           | 64*               | 11.31      | 2  | .01          |
|        | Binaural           | 54                | 24.00      | 2  | .01          |
| 9      | Total Experimental | 118*              | 87.66      | 2  | .01          |
|        | Monaural           | 63*               | 47.40      | 2  | .01          |
|        | Binaural           | 55*               | 41.30      | 2  | .01          |

tendencies: 1) more frequently misunderstands instruction; 2) more frequently strains to hear speech; 3) more frequently watches the speaker's face closely; 4) more frequently appears restless, or tires easily; 5) angers easily more frequently; 6) less frequently understands other children when playing; and 7) more frequently plays the radio or TV too loudly.

Binaural Group. In comparison to their control group, the binaural hearing loss subjects were judged by their parents to display the following behavior tendencies: 1) is frequently less popular with other boys and girls; 2) more frequently strains to hear speaker's voice; 3) is less frequently interested in conversation; 4) less frequently understands other children when playing; and 5) more frequently plays the radio and TV too loudly.

It is interesting to note that children with monaural hearing losses received more undesirable parental ratings than did the children with binaural hearing losses.

Pictographic Self Rating Scale. Table 18 summarizes the analysis of variance testing for differences among groups in attitude toward subject and classroom activity participation.

Table 18

Public School Program: Summary of Analysis  
of Variance for Pictographic Scale Scores

| Groups                | N   | F    | Significance* |
|-----------------------|-----|------|---------------|
| Experimental          | 150 | .99  | ns            |
| Control               | 150 |      |               |
| Monaural Experimental | 79  | .85  | ns            |
| Monaural Control      | 79  |      |               |
| Binaural Experimental | 71  | 1.27 | ns            |
| Binaural Control      | 71  |      |               |

\* Tabled values:  $F_{.05}(df=1/150) = 3.90$ ;  $(df=1/300) = 3.87$

With all obtained *F*-ratios clearly nonsignificant, it would appear that experimental and control subjects are not significantly different in attitude toward subject matter and classroom activity participation. Caution should be exercised in interpreting these results, however, since the Pictographic Scale was used experimentally and outside the limits of standardization.

Revised Knox Cube Test. Table 19 is a summary of the analysis of variance among groups. Employed in the analysis were the point values of raw scores for this test of 'visual' memory span. Although results at the .05 significance level were not found, it should be noted



that the difference between the total group of experimental and control subjects approached significance (.10 level).

Table 19

*Public School Program: Summary of Analysis  
of Variance for Revised Knox Cube Scores*

| Groups                | N   | F    | Significance* |
|-----------------------|-----|------|---------------|
| Experimental          | 150 | 3.04 | .10           |
| Control               | 150 |      |               |
| Monaural Experimental | 79  | 1.06 | ns            |
| Monaural Control      | 79  |      |               |
| Binaural Experimental | 71  | 2.11 | ns            |
| Binaural Control      | 71  |      |               |

\* Tabled values:  $F_{.05}(df=1/150) = 3.90$ ;  $(df=1/300) = 3.87$ .

Intelligence Data. The intelligence quotients for both the experimental and control groups were obtained from the Ammons Full Range Picture Vocabulary Test administered in the school systems by the experimenters. These data were treated by analysis of variance technique. The means and mean differences for comparisons of total groups and sub-groups are reported in Appendix 14.

The result of comparisons for major groups are presented in Table 20 and indicate a significant difference between total experimentals and controls, binaural, experimentals and controls, and female experimental and control subjects. The control subjects consistently exhibited higher mean intelligence scores than the experimental subjects.

Table 20

**Public School Program: Summary of Analysis  
of Variance for IQ Scores**

| <b>Groups</b>         | <b>N</b> | <b>F</b> | <b>Significance</b> |
|-----------------------|----------|----------|---------------------|
| Experimental          | 150      | 8.68     | .01                 |
| Control               | 150      |          |                     |
| Monaural Experimental | 79       | .50      | ns                  |
| Monaural Control      | 79       |          |                     |
| Binaural Experimental | 71       | 11.22    | .01                 |
| Binaural Control      | 71       |          |                     |
| Male Experimental     | 75       | 2.02     | ns                  |
| Male Control          | 69       |          |                     |
| Female Experimental   | 75       | 9.20     | .01                 |
| Female Control        | 81       |          |                     |

In view of the above findings, a further analysis of IQ scores was performed to determine the relations between levels of hearing loss and intelligence scores. These results, presented in Table 21, reveal a significant difference between experimental and control subjects at binaural hearing loss level II (40-59 db). A trend toward significance (.10 level) was noted for binaural hearing loss level IV (75-100 db).

Further analyses were made for binaural hearing loss subjects by sex and race, and are presented in Table 22. It can be seen that the significant difference found for female and control subjects may be attributed to the negro sample. The predominance of negro subjects in binaural hearing loss level II may account for the observed significance cited above.

Table 21

Public School Program: Summary of Analysis of Variance  
for IQ Scores by Levels of Binaural Hearing Loss

| Levels of Loss |              | N  | F    | Significance |
|----------------|--------------|----|------|--------------|
| Level 1        | Experimental | 17 | .47  | ns           |
|                | Control      | 17 |      |              |
| Level 2        | Experimental | 30 | 6.01 | .05          |
|                | Control      | 30 |      |              |
| Level 3        | Experimental | 15 | 2.80 | ns           |
|                | Control      | 15 |      |              |
| Level 4        | Experimental | 9  | 3.86 | .10          |
|                | Control      |    |      |              |

Table 22

Public School Program: Summary of Analysis of Variance for  
IQ Scores by Sex and Race for Binaural Hearing Loss Groups

| Groups                    | N  | F     | Significance |
|---------------------------|----|-------|--------------|
| Experimental Female       | 36 | 9.86  | .01          |
| Control Female            | 43 |       |              |
| White Experimental Female | 27 | 2.32  | ns           |
| White Control Female      | 30 |       |              |
| Negro Experimental Female | 9  | 20.88 | .01          |
| Negro Control Female      | 13 |       |              |



Academic Achievement and Classroom Performance. School record data pertaining to standardized academic achievement measures were provided by the participating school systems for both experimental and control subjects. Teacher ratings of the subjects' general classroom performance also were obtained. These data were analyzed for trends and significant differences.

Academic Achievement. Comparisons between experimental and control subjects were made on the following sub-tests of the Stanford and Metropolitan Achievement Tests: 1) Average Reading; 2) Spelling; and 3) Average Arithmetic. Subjects' scores were expressed as "greater than," "equal to," or "less than," actual grade placement. The results of the group comparisons based on these transformed scores are presented in Table 23.

Table 23

Public School Program: Summary of Chi-Square Comparisons  
for Three Areas of Academic Achievement

| Achievement Area   | Groups  | N <sub>obs.</sub> | df | Chi-Square | Significance* |
|--------------------|---------|-------------------|----|------------|---------------|
| Average Reading    | Exper.  | 111               | 2  | 9.39       | .01           |
|                    | Control | 111               |    |            |               |
| Spelling           | Exper.  | 94**              | 2  | 5.97       | .10           |
|                    | Control | 95                |    |            |               |
| Average Arithmetic | Exper.  | 116**             | 2  | 3.21       | ns            |
|                    | Control | 114               |    |            |               |

\* Tabled Values:  $X^2_{.05} (df=2) = 5.99$ ;  $X^2_{.01} (df=2) = 9.21$ .

\*\* Frequencies adjusted for unequal Ns, control subjects providing expected frequencies.

Relative to average reading achievement, the total control group was significantly superior to the experimental group. With regard to spelling achievement, a trend (.10 level) favoring the control group also was found. Analysis of average arithmetic achievement data failed to reveal statistically significant differences between experimental and control groups. Insofar as reading and spelling achievement are attributes of language skill and development, these results tend to support the existence of language deficits in hearing impaired children.

General Classroom Performance. General classroom performance of experimental and control subjects was rated by classroom teachers as follows: above average, average, below average. The distributions of ratings for the experimental and control groups were compared as presented in Table 24 and Figure 13.

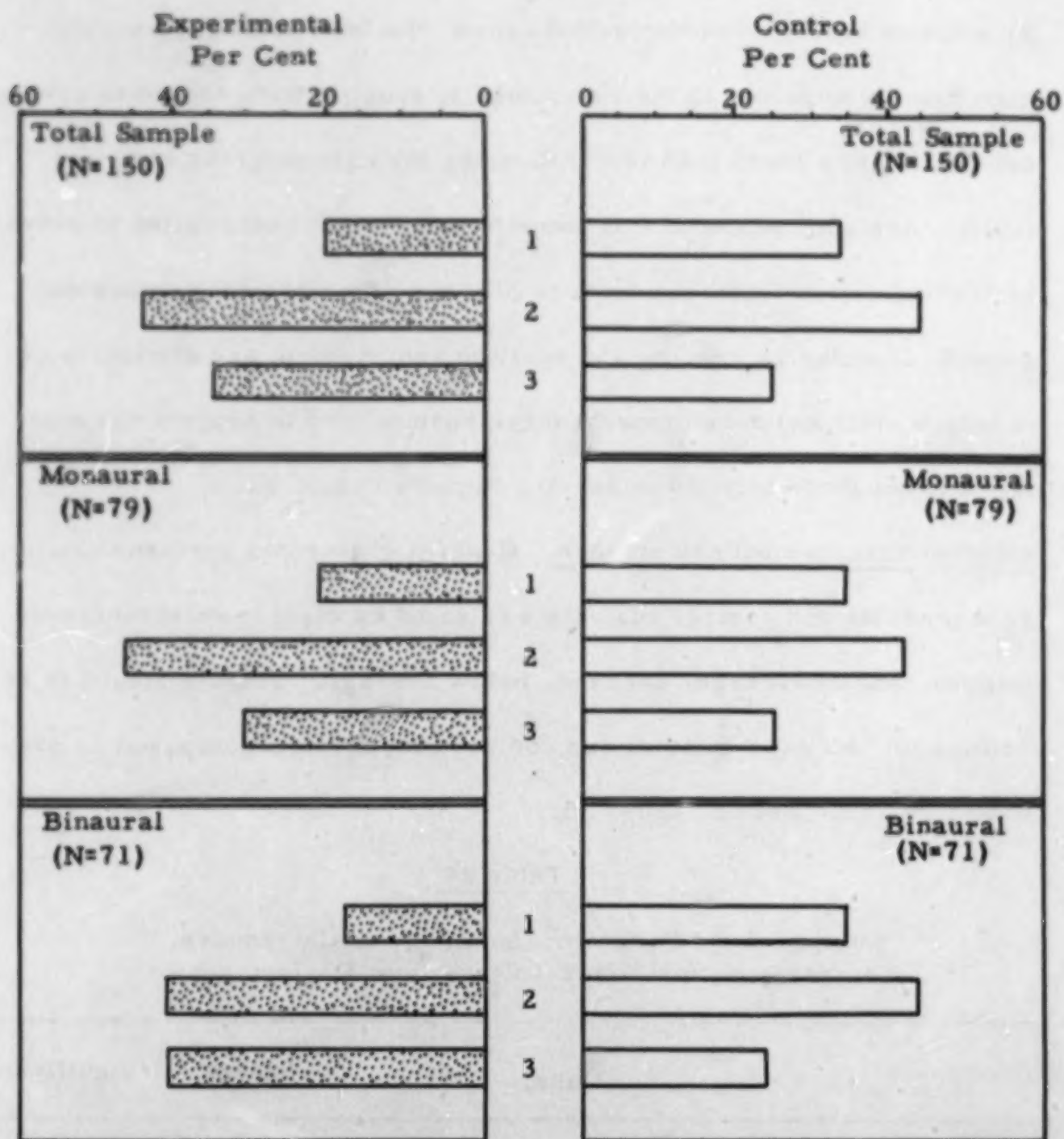
Table 24

Public School Program: Summary of Chi-Square Comparisons for General Classroom Performance

| Groups                | N <sub>obs.</sub> | df | Chi-Square | Significance* |
|-----------------------|-------------------|----|------------|---------------|
| Experimental          | 142**             | 2  | 17.78      | .01           |
| Control               | 140               |    |            |               |
| Monaural Experimental | 77**              | 2  | 5.69       | .10           |
| Monaural Control      | 75                |    |            |               |
| Binaural Experimental | 65                | 2  | 14.91      | .01           |
| Binaural Control      | 65                |    |            |               |

\* Tabled Values:  $X^2_{.05} (df=2) = 5.99$ ;  $X^2_{.01} (df=2) = 9.21$

\*\* Frequencies adjusted for Unequal Ns, control subjects providing expected frequencies.



1. Above Average Performance
2. Average Performance
3. Below Average Performance

Figure 13. General Classroom Performance Ratings for Public School Groups Averaged across Levels of Hearing Loss



These data tend to indicate that control subjects received higher ratings than experimental subjects in both total group and sub-group binaural comparisons. A trend (.10 level), favoring the monaural control group, is also noted. Distributions of teacher ratings for control and experimental subjects by levels of hearing impairment are presented graphically in Figures 14 and 15.

It would appear that children with hearing impairments are judged by their teachers to be lower in general classroom performance than their classmates. These group differences between hearing impaired and normal hearing children are most pronounced when the hearing impairment is a binaural loss.

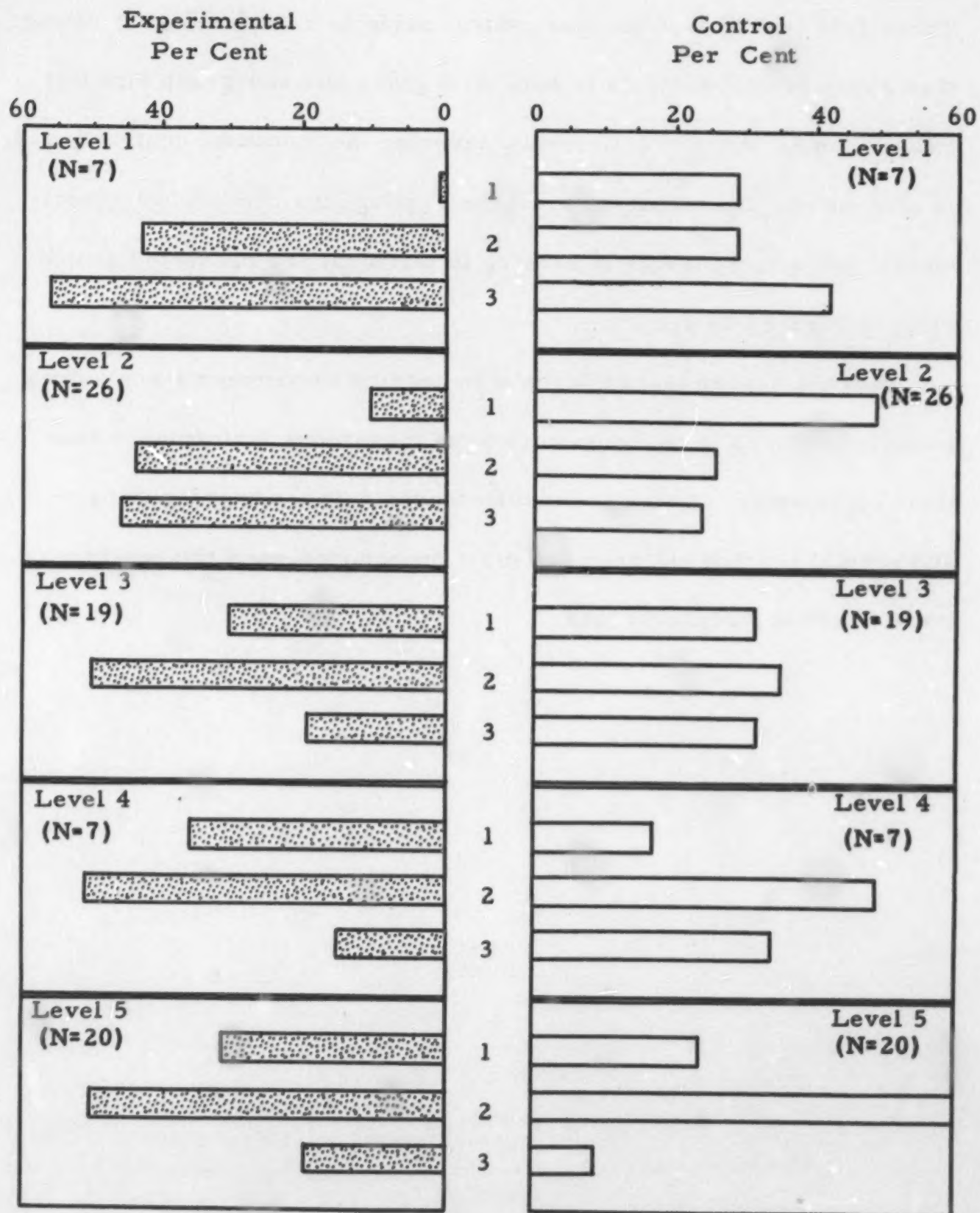


Figure 14. General Classroom Performance Ratings for Public School Groups: Analysis by Level of Hearing Loss within Monaural Loss Groups

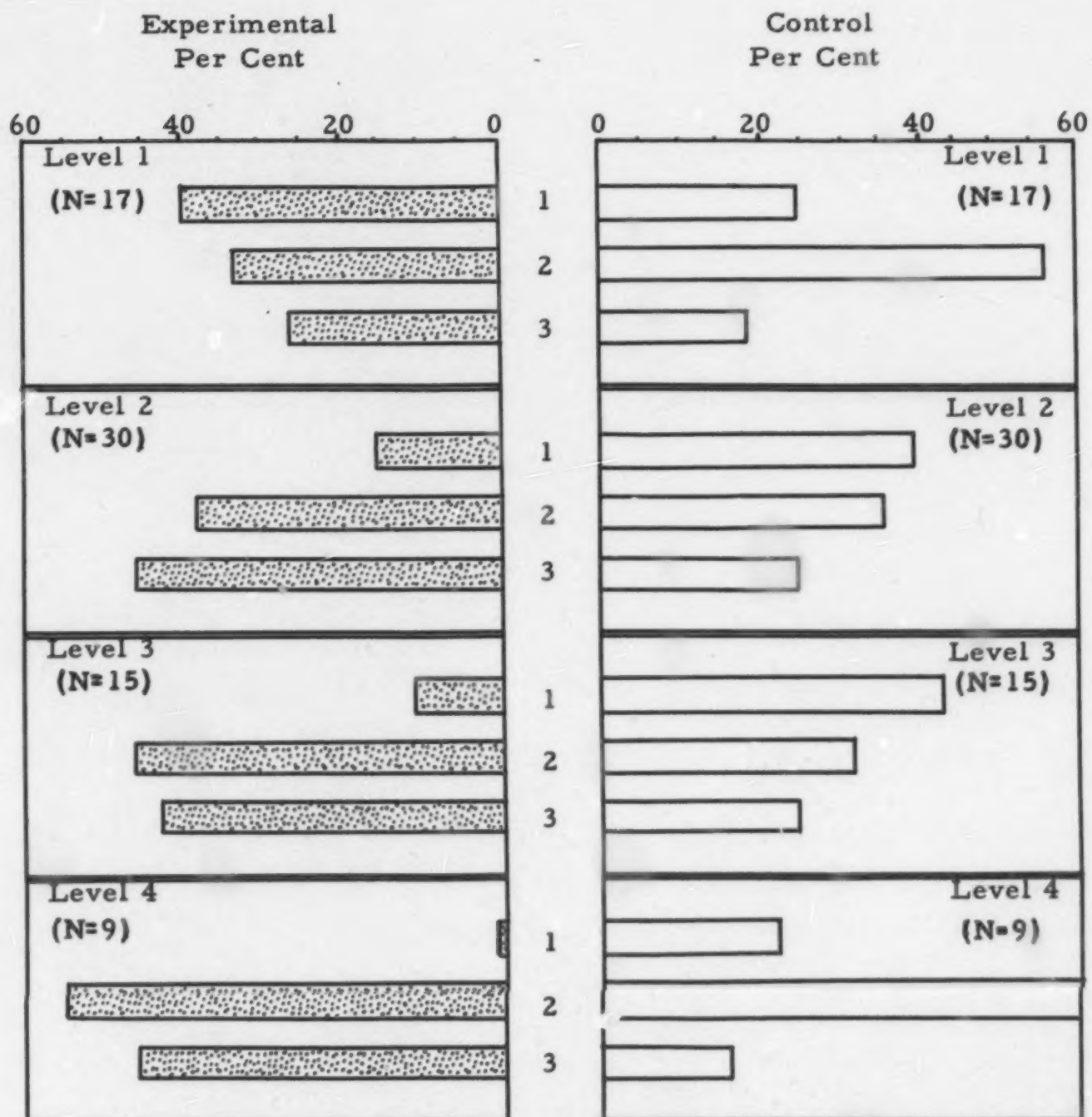


**Figure 15. General Classroom Performance Ratings for Public School Groups: Analysis by Level of Hearing Loss within Binaural Loss Groups**



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### SUMMARY AND CONCLUSIONS

The present study was designed to assess behavioral and academic implications of hearing impairment in school-aged children. To assure inclusion of samples representing a range of hearing losses, the subjects were chosen from the following designated school environments: regular public school classrooms, and special classrooms for acoustically or multiple-handicapped children.

More specifically, the purpose of the study was to examine statistically the relation of hearing loss in children to information derived from 1) sociometric tests, 2) social behavior trend indexes, 3) teacher interviews, 4) parent questionnaires, and 5) standardized achievement and intelligence tests.

#### Public School Classroom Program

In the public school segment of the study, 300 subjects were drawn from grades four through seven in four public school systems in Indiana. The hearing impaired pupils were selected on the basis of audiograms obtained from the Purdue University Public School Hearing Test Service, or directly from school systems in which audiometric surveys are routinely conducted by local staff. The hearing impaired pupils were matched with randomly selected normal hearing control subjects from the same classrooms.

All subjects were classified according to school grade, race, sex, level of hearing loss, and extent of impairment (monaural or binaural). The monaural hearing loss levels, based on the average loss for the speech frequencies (500, 1000, and 2000 cps), were as follows: I - less than 20 db (borderline), II - 20-39 db (mild), III - 40-59 db (moderate), IV - 60-74 db (severe), and V - 75-100 db (profound). The levels of binaural hearing loss, based on better ear average for the speech frequencies, were: I - 20-39 db (mild), II - 40-59 db (moderate), III - 60-74 db (severe), and IV - 75-100 db (profound). For these variables the 300 subjects in the study were distributed by grade, race, and sex as follows: Grade - Fourth - 62 pupils (31 experimental and 31 control); Fifth - 100 pupils (50 experimental and 50 control); Sixth - 52 pupils (26 experimental and 26 control); and Seventh - 86 pupils (43 experimental and 43 control); Race - 68 negro pupils (37 experimental and 31 control), and 232 white pupils (113 experimental and 119 control); and Sex - 144 males (75 experimental and 69 control), and 156 females (75 experimental and 81 control).

Each subject was administered individually the Ammons Full Range Picture Vocabulary Test (intelligence), Pictographic Self Rating Scale, and the Revised Knox Cube Test. Additional data also were obtained from school records (academic achievement), teacher ratings (Cowell Social Behavior Trend Index and general classroom performance), and a parent questionnaire. It should be noted that, when the experimental and control groups were compared for the background variables of



parental age, parental occupation, and parental highest school grade, as well as number of siblings and birth order, no consistent differences were found.

### Special Classroom Program

In this segment of the study, subjects were selected to represent pupils with moderate to profound hearing impairment. Of the 77 hearing impaired subjects drawn from four Indiana cities, 34 were from four Oral Training Units, 29 from three Special Classes for the Hard of Hearing, and 14 from a State School for the Mentally Retarded. The age range of the subjects was from five years and six months, to twenty-three years and two months. Except for the experimental subjects in two of the Oral Training Units, where recent audiograms were available, the experimental subjects were administered audiometric pure tone threshold tests.

With few exceptions, the experimental subjects were administered the following measures of social and behavioral adjustment: 1) Sociometric Questionnaire, 2) Social Distance Questionnaire, 3) Guess-Who Questionnaire, and 4) Self Report. Additional information was obtained through teacher ratings (Cowell Social Behavior Trend Index), parent and teacher interviews, and parent questionnaires. Information relative to academic performance and intelligence was obtained from school records.

The descriptive attributes of the experimental subjects in the Special Classroom Program included the following variables: 1) sex, 2) chronological age, 3) age at admission to special classroom programs, 4) length of enrollment in special programs, 5) age at diagnosis of hearing



impairment, 6) handicaps in addition to hearing impairment, 7) hearing aid usage, 8) attendance at a state school for the deaf, 9) history of auditory impairment in immediate family, 10) number of children in family, 11) sibling order of subject in family, 12) intelligence, 13) degree of integration into regular classroom, and 14) type and level of hearing impairment. Certain interesting trends were noted.

Only qualitative observations were made in the Special Classroom segment of the study and therefore refined statistical treatment was not appropriate. Quantification of the qualitative observations suggest, however, certain trends and these are reported in the conclusions as warranting consideration and further investigation.

### Conclusions

Within the limitations imposed on the study by sampling procedures, tests and testing techniques, reliability of information sources, methods of data analysis and the interpretation of the statistical findings, the results obtained suggest the following conclusions:

#### I. Public School Classroom Programs

1. As judged by teachers' ratings, pupils with binaural types of hearing impairment are less socially adjusted than their normal hearing classmates; pupils with monaural hearing loss, on the other hand, are not judged to differ in social adjustment as measured by the same test (Cowell Social Behavior Trend Index).
2. In comparison to their normal hearing classmates, hearing loss pupils, as a group, are judged by their parents to be less frequently popular with other boys and girls, to strain more frequently in

listening to persons talking, to seem less frequently interested in conversation, to tire easily or appear restless more frequently, to understand other children less frequently while playing, and to play the radio or TV too loudly more frequently. (Parent Questionnaire)

3. Pupils with monaural hearing losses, in comparison to normal controls, as a group, are judged by their parents to misunderstand instructions more frequently, to strain more frequently in hearing speech, to watch the speaker's face closely more frequently, more frequently to appear restless or to tire easily, and more frequently to play the radio or TV too loudly. They are also judged to understand other children less frequently when playing. (Parent Questionnaire)
4. Pupils with binaural hearing losses, in comparison to normal hearing pupils, are judged to strain more frequently to hear a speaker's voice, and to play the radio or TV too loudly. They are found to be less frequently popular with other boys and girls, to be less frequently interested in conversation, and less frequently to understand other children while playing. It is noted that subjects with monaural hearing impairment receive more undesirable parental ratings than those with binaural hearing loss. (Parent Questionnaire)
5. Hearing impaired and normal hearing pupils are not found to differ significantly in attitude toward subject matter and classroom activity participation as measured by the Pictographic Self Rating Scale.
6. Normal hearing subjects and pupils with hearing loss are not found to differ significantly in the Revised Knox Cube Test employed as a measure of 'visual' memory span; however, a trend is noted in the direction of higher scores for normal hearing pupils.
7. Hearing loss subjects are found to manifest significantly lower average intelligence scores than normal hearing pupils as measured by the Ammons Full Range Picture Vocabulary Test. This difference is attributable primarily to pupils with a binaural



type hearing loss and at a loss level of 40-59 db. Moreover, it appears that the differences are primarily attributable to the female negro pupils with binaural hearing impairments included in the experimental group.

8. As rated by teachers, the general classroom performance of hearing impaired pupils is significantly lower than for normal hearing pupils. This finding is attributable primarily to the inclusion of pupils with binaural hearing losses. However, a trend is present for monaural hearing loss pupils also to be rated lower than normal hearing control subjects.
9. As measured by standard achievement tests (Metropolitan or Stanford), normal hearing pupils are superior to their hearing impaired classmates in average reading and arithmetic achievement, and to a limited extent tend to be superior in spelling achievement.

## II. Special Classroom Program

1. Pupils with moderate to profound hearing impairments tend to receive relatively lower popularity ratings (Sociometric Questionnaire) in the regular classroom than in their special classroom environment both as a group and when levels of hearing loss are considered.
2. Hearing impaired pupils tend to receive less social acceptance as the extent of hearing impairment increases; however, on a relative basis, they would tend at all levels to be within the range of social acceptance as measured by the Social Distance Questionnaire.
3. When making self ratings which reflect awareness of problems related to hearing loss, acoustically handicapped pupils in a special classroom environment do not present consistent response trends (Self Report questionnaire).
4. Relative to behavior, hearing impaired pupils in integrated classrooms tend to be judged by other students as follows: usually quiet and seldom talk,



do not speak plainly, and have problems that sometimes make school difficult (Guess-Who Questionnaire).

5. Pupils in Special Classroom Programs (Hard of Hearing Classes and Oral Training Units) generally are rated in the acceptable range of social adjustment by both special and regular classroom teachers. However, significantly more favorable ratings are made by special rather than regular classroom teachers (Cowell Social Behavior Trend Index).
6. Oral Training Center pupils frequently are judged by their parents to manifest greater need for approval than would be the case if normal hearing were present. Parents also indicate that other persons tend to speak louder and use more gestures when the child's hearing loss is discovered. These parents also report that their children rarely tend to be cliquish or to worry about saying the 'right' thing just to please others (Parent Questionnaire).
7. Hard of hearing class pupils are reported by their parents to manifest a relatively strong tendency to need parental approval, to interrupt others while talking, and to show that many of their problems are based upon the hearing impairment. Less frequently mentioned by parents were tendencies toward cliquishness or worry about saying the correct thing to others (Parent Questionnaire).
8. Academic retardation in Special Classroom pupils appears inversely related to the degree of hearing loss (Academic Achievement Tests).
9. Pupils in Special Classroom Programs tend to be consistently below normal grade placement for their chronological age (Academic Achievement Tests).

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## Appendix 1

## Descriptive Classification of Hearing Loss

| Study                 |                                                                                                                                                                                                                                                                                                                                                                                                                  |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ewing (38)            | <p>Grade 1. Children who have hearing defects but require no hearing aid nor special educational treatment.</p> <p>Grade 11. Children who have naturally acquired speech, but need special educational treatment. Many need hearing aids.</p> <p>Grade 111. Deaf children who are without naturally acquired speech when admitted to school. Many can be helped by hearing aids to learn to talk distinctly.</p> |
| Huizing (69)<br>1953  | <p>Grade 1. Slight loss: 0-30 db</p> <p>Grade 11. Moderate loss (practical speech span): 30-60 db</p> <p>Grade 111. Severe loss: 60-90 db</p> <p>Grade 1V. Deaf (No speech understanding ability): More than 90 db</p>                                                                                                                                                                                           |
| Keaster (78)<br>1948  | <p>Group 1. Slight Hearing Loss: As much as 20 db below normal intensity</p> <p>Group 11. Moderate Hearing Loss: As much as 40 db below normal intensity</p> <p>Group 111. Severe Hearing Loss: 60 db or more below normal intensity loss</p>                                                                                                                                                                    |
| Lesser (84)<br>1950   | <p>Mid-Moderate Hearing Loss: 30-40 db speech reception threshold loss</p> <p>Profound Hearing Loss: 70 db / speech reception threshold</p>                                                                                                                                                                                                                                                                      |
| Pintner (109)<br>1940 | <p>Slightly Hard of Hearing: Less than db loss in better ear.</p> <p>Extremely Hard of Hearing: 15 db or greater loss in better ear</p>                                                                                                                                                                                                                                                                          |
| Streng (140)<br>1955  | <p>Class 1. Mild Hearing Loss: 20-25 db better ear loss in speech range</p> <p>Class 11. Marginal Hearing Loss: 30-40 db hearing loss</p> <p>Class 111. Moderate Hearing Loss: 40-60 db hearing loss</p> <p>Class 1V. Severe Hearing Loss: 60-75 db hearing loss</p> <p>Class V. Profound Hearing Loss: 75+ db hearing loss</p>                                                                                  |



## Appendix 1 (con't)

|                                                |                                                                                                                                             |                                                                                                       |
|------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| Garrison and<br>Force (48)<br>1959             | Class A.                                                                                                                                    | Normal: Not more than 15 db loss in worse ear                                                         |
|                                                | Class B.                                                                                                                                    | Near Normal: More than 15 db but not more than 30 db in either ear                                    |
|                                                | Class C.                                                                                                                                    | Mild Impairment: More than 30 db but not more than 45 db in better ear                                |
|                                                | Class D.                                                                                                                                    | Serious Impairment: More than 45 db but not more than 60 db in better ear                             |
|                                                | Class E.                                                                                                                                    | Severe Impairment: More than 60 db but not more than 90 db in better ear                              |
|                                                | Class F.                                                                                                                                    | Profound Impairment: More than 90 db in better ear loss based on average for 500, 1000, and 2000 cps. |
|                                                | Class G.                                                                                                                                    | Total Hearing Loss for Both Ears                                                                      |
| Siegenthaler<br>and<br>Krzywicki (129)<br>1959 | Non-significant loss: Threshold poorer than 20 db at one or more frequencies from 250-4000 cps.                                             |                                                                                                       |
|                                                | Significant loss: Average threshold for frequencies 500, 1000, and 2000 cps 20 db or more in one ear only                                   |                                                                                                       |
|                                                | Handicapping loss: Average better ear threshold for 500, 1000, and 2000 cps 20 db or more in one ear only                                   |                                                                                                       |
|                                                | Severely Deaf: Response to sound 60-80 db above normal threshold for two or more pitch pipes covering the range 500-2000 cps.               |                                                                                                       |
|                                                | Profoundly Deaf: No response to sound louder than 80 db above normal threshold for two or more pitch pipes covering the range 500-2000 cps. |                                                                                                       |
| Gaskill (49)<br>(n. d.)                        | Partially Deaf:                                                                                                                             | 40 db loss or less                                                                                    |
|                                                | Partially Deaf:                                                                                                                             | 40-60 db loss                                                                                         |
|                                                | Severely Deaf:                                                                                                                              | 60-80 db loss                                                                                         |
|                                                | Profoundly Deaf:                                                                                                                            | 80-89 db loss                                                                                         |
|                                                | Profoundly Deaf:                                                                                                                            | 90 db or greater                                                                                      |

## Appendix 2

**Summary of Performance Scales and Non-Verbal Tests  
for the Hard of Hearing**

| Researcher                          | Test                                                                                                                                                                                                                            | Population tested and Results                                                                                                                                                                                                                                   |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DuToit (34)<br>1954 (Africa)        | DuToit Test<br>(A battery of 6 items<br>from other tests, paper<br>and pencil test, independ-<br>ent of schooling, language,<br>speed)                                                                                          | 289 deaf children: Mean I. Q.<br>was 98.53                                                                                                                                                                                                                      |
| Gaskill (49)                        | Wechsler Performance<br>Scale<br>Raven's Progressive<br>Matrices (1947)                                                                                                                                                         | 465 deaf and partially deaf,<br>10-15 years:<br><br>350 deaf pupils 11-15 years old:<br><br>Mean for both groups was 97.<br>Degree of hearing loss not sig-<br>nificantly related to I. Q. scores.<br>On Raven Matrices 50% scored<br>definitely below average. |
| Gaskill (49)                        | Rates Reading Vocabu-<br>lary Test & Otis Beta<br>Mental Ability Scale,<br>National Institute of In-<br>dustrial Psychology<br>Tests; 70/1 (non-verbal)<br>Wechsler Mental Ability<br>Scale Form 1, Perform-<br>ance and verbal | 65 deaf and partially deaf;<br>grammar school pupils:<br>Mean verbal score of 99 for both<br>groups; 92 for deaf, 106 for par-<br>tially deaf. Higher academic<br>achievement and potential for<br>partially deaf group as opposed<br>to deaf group.            |
| Goetzinger<br>& Rousey<br>(51) 1959 | Wechsler Intelligence<br>Scale (Adult) Perform-<br>ance, Binet Vocabulary<br>Test, and Stanford<br>Achievement Test                                                                                                             | 101 deaf students, between 14-21<br>years, enrolled in a state resi-<br>dential school 61 congenitally<br>deaf, 41 acquired severe deaf:**<br>Congenitally deaf, I. Q. = 103.5;<br>Acquired deaf I. Q. = 97.9                                                   |
| Hiskey (82)                         | Nebraska Test of Learn-<br>ing Appitude                                                                                                                                                                                         | 466 deaf children, 380 hearing<br>children; 4-10 years:<br>Deaf rated slightly lower. Aver-<br>age quotient for deaf in mid-90's.                                                                                                                               |



## Appendix 2 (con't)

|                                             |                                                                                                               |                                                                                                                                                                                                             |
|---------------------------------------------|---------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Justman, J.,<br>et.al. (76)                 | Wechsler Intelligence<br>Scale for Children<br>(Performance Scale)                                            | 8 deaf and 2 severely hard of<br>hearing, mean C.A. of 8.8<br>years: 106 mean I.Q.                                                                                                                          |
|                                             | Stanford Achievement<br>Test<br>Elementary Battery<br>(Form J and K)                                          | Average Reading<br>Grade: 2.7<br>Average Arithmetic<br>Grade: 3.2                                                                                                                                           |
| Kendall (79)<br>1948-1953<br>(England)      | Selected parts of the<br>Merrill-Palmer Scale<br>and Object-Fitting Test                                      | 392 deaf and 328 hearing pre-<br>school children; 18-65 months:*<br>Test scores essentially similar<br>for the both groups.                                                                                 |
| Murphy (96)<br>1953<br>(Ewing)<br>(England) | Wechsler Intelligence<br>Test (Adult) Perform-<br>ance Scale                                                  | 12 years old; 119 deaf children<br>from day schools and 394 twelve<br>year old deaf children from resi-<br>dential schools:<br>Mean of group not significantly<br>different from Wechsler's norms.          |
| Murphy (97)<br>195? (England)               | WISC, Performance<br>sub-scale                                                                                | 300 deaf children from day and<br>residential schools ages 6-10<br>years:<br>Mean for total sample 98.79.<br>Day school enrollees earned<br>significantly higher scores than<br>institutionalized subjects. |
| Murphy (96)<br>19??(England)                | Gates Reading Vocabu-<br>lary                                                                                 | 513 twelve-year old deaf child-<br>ren, 394 residential school, 119<br>from day school:<br>7.68 for day school, 6.4 for<br>residential school.                                                              |
|                                             | National Institute of<br>Industrial Psychology<br>Non-Verbal Group In-<br>telligence Test (NIIP)<br>Test 70/1 | 513 twelve-year old deaf child-<br>ren, 394 residential school,<br>119 from day school:<br>101.4 for day school, 100.4 for<br>residential school.                                                           |
|                                             | Schonell Essential<br>Mechanical Arithmetic<br>Test (Form A)                                                  | 513 twelve-year old deaf children,<br>394 residential school, 119 from<br>day school:<br>12.5 day school pupils, 11.8 for<br>residential school pupils.                                                     |



## Appendix 2 (con't)

|                                     |                                                                           |                                                                                                                                                                    |
|-------------------------------------|---------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mylkebust<br>(103)<br>1958          | Hiskey Blocks, Draw-A-Man, Porteus Maze, Healy I, Chicago Non-Verbal      | 63 deaf children with other handicaps:<br>Not significantly different on measures of concrete intelligence. Considerably below on measures entailing abstractions. |
| Mylkebust<br>(98) 1941              | Grade Arthur Performance Scale                                            | 189 deaf children; 121 congenitally deaf, 68 acquired deaf: Both groups of average intelligence.                                                                   |
| Oleron (107)<br>1950                | Raven's Progressive Matrices (1938 Edition)                               | 246 deaf, 9-21 years: *<br>Marked inferiority and slower mental development.                                                                                       |
| Pintner (111)                       | A non-language group mental test                                          | 6,604 deaf pupils, 8-21 years: Deaf found significantly lower than normal hearing.                                                                                 |
| Pintner &<br>Paterson<br>(114) 1915 | Binet-Simon Scale (Goddard Revision)                                      | 18 deaf children:<br>Average mental retardation, 4.85 years.                                                                                                       |
| Pintner &<br>Paterson<br>(114) 1915 | Pintner-Paterson Performance Scale                                        | deaf group: *<br>Deaf earned lower scores than normals.                                                                                                            |
| Pintner &<br>Paterson<br>(115) 1916 | Digit-Symbol and Symbol Digit Tests                                       | 992 deaf children tested with Digit-Symbol Test, 1049 deaf children tested with Symbol-Digit Test:<br>Deaf retarded 3.75 on Digit-Symbol and 2.9 on Symbol-Digit.  |
| Ross (121)<br>1953                  | Nebraska Test of Learning Aptitude and Ontario School Ability examination | 61 deaf children, 3-10.6 years. Nebraska= 104.8; Ontario= 104.6                                                                                                    |
| Streng &<br>Kirk (137)<br>1938      | Grade Arthur Performance Scale and Chicago Non-Verbal Examination         | 97 deaf and hard of hearing day-school pupils; 6-18 years. Grade Arthur mean 100.9 and Chicago non-verbal 95.5; Groups considered of average intelligence.         |

\* Instructions demonstrated, pantomimed, or given manually.

\*\* Subjects clarified responses with manual alphabet or signs.

## Appendix 3

## Summary of Intellectual and Achievement Tests for the Hard of Hearing

| Researcher               | Test                                                                               | Population tested and Results                                                                                                                                 |
|--------------------------|------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Gaskill (49)<br>(n. d.)  | Weschler Intelligence Scale, Adult, Verbal                                         | 65 Grammar School Pupils:<br>Mean I. Q. Deaf: 92<br>Mean I. Q. Partially Deaf: 106                                                                            |
| Hebbe (61)<br>1936       | Not Reported                                                                       | 48 hard of hearing boys:<br>Mean I. Q. 90.8<br>48 normal hearing boys:<br>Mean I. Q. 92.5                                                                     |
| Kendall (79)<br>(n. d.)  | Merrill-Palmer Scale and Atkins Object-Fitting Test (both tests slightly modified) | 328 normal hearing, 392 deaf or partially deaf children between 18 and 65 months:<br>Essentially similar scores for normals and hard of hearing.              |
| Madden (90)<br>1931      | Binet                                                                              | 46 normal hearing children:<br>Mean I. Q. 83.46<br>46 hard of hearing children:<br>Mean I. Q. 77.04                                                           |
|                          | Rapid Survey                                                                       | 537 normal hearing children:<br>Mean I. Q. 84.85<br>46 hard of hearing children:<br>Mean I. Q. 77.09                                                          |
|                          | Otis Group                                                                         | 170 normal hearing children:<br>Mean I. Q. 101.55<br>13 hard of hearing children:<br>Mean I. Q. 93.38                                                         |
| Negley (104)<br>1944     | Average Achievement Grades - Teacher's assigned grades for 10 subjects             | 44 hard of hearing, 23 normal hearing children in grades 4-7:<br>Average school marks for 10 subjects lower for hard of hearing group.                        |
| Pintner (111)<br>(n. d.) | Pintner Educational-Achievement Test                                               | Normal hearing n= 536: (Grades 5 & 6)<br>Mean Score: 35.4<br>Hard of Hearing n=402:<br>Mean Score: 34.4<br>Extremely hard of hearing n=78<br>Mean Score: 33.1 |



## Appendix 3 (con't)

|                                |                                                                                                                                   |                                                                                                                                                                                                                                                                                                                            |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Pintner &<br>Lev (113)<br>1939 | Pintner Intelligence<br>Test (Group, verbal<br>test)                                                                              | 1,286 normal hearing: (Grades<br>Mean I. Q. 99.75 5-8)<br>1,186 all hard of hearing:<br>Mean I. Q. 94.67<br>461 extremely hard of hearing<br>(selected from hard of hearing<br>group):<br>Mean I. Q. 92.47                                                                                                                 |
| Reynolds<br>(118)<br>1955      | California Achievement<br>Test                                                                                                    | 36 hard of hearing with minimal<br>losses; 36 matched normals;<br>7-9th grades:<br>7.1 Total Test: Score 7.4<br>7.0 Reading: Score 7.3<br>6.9 Arithmetic: Score 7.3                                                                                                                                                        |
|                                | California Short Form<br>of Mental Maturity<br>(non-language test)                                                                | 36 hard of hearing with minimal<br>losses; 36 matched normals;<br>7-9th grades:<br>Mean I. Q. Experimental Group:<br>97.47<br>Mean I. Q. Control Group: 97.67                                                                                                                                                              |
| Templin<br>(143)<br>1954       | Deutsche Questions of<br>Natural Phenomena                                                                                        | 78 normal hearing; 78 hard of<br>hearing; 78 deaf; Subjects be-<br>tween 10 and 12 years of age:<br>Normal response, more simi-<br>lar to normal than deaf, 5 to<br>8 years retardation.                                                                                                                                   |
| Templin<br>(141)               | Deutsche Questions<br>Long and Welch Test<br>of Casual Reasoning<br>(Revised), and Brody<br>Non-Verbal Abstract<br>Reasoning Test | 565 normal hearing subjects; 108<br>day-school pupils (mean percent-<br>age loss 49.5%); 177 residential<br>school pupils (mean percentage<br>loss 86.4%); (age ranges 10-20<br>years):<br>Defective hearing group all re-<br>ceived lower scores on all reason-<br>tests. Deficit increases with<br>greater hearing loss. |
| Waldman,<br>et. al. (148)      | General Verbal Intelli-<br>gence Test                                                                                             | 466 good hearers: Mean I. Q.<br>99.6<br>86 poor hearers: Mean I. Q. 92.1                                                                                                                                                                                                                                                   |



## Appendix 3 (con't)

Waldman (con't)

(1) 9 S. U. loss or less:

Mean I. Q. 99.4

(2) More than 9 S. U.

Mean I. Q. 91.1

## Appendix 4

Comparison, Age and Sex Date, of Subject Samples Drawn for Special Classroom Section of the Study: Consideration of Individual Subjects

| Subject and School System | Sex | Age Yrs.Mos. | Age Admission (years) | Length of Enrollment (years) | Age at Diagnosis of Hearing Impairment (years) |
|---------------------------|-----|--------------|-----------------------|------------------------------|------------------------------------------------|
| (Ft. Wayne, Unit 1)       |     |              |                       |                              |                                                |
| 1                         | F   | 6.5          | 3-1/2                 | 3                            | 2                                              |
| 2                         | M   | 7.2          | 6                     | 1                            | 2-1/2                                          |
| 3                         | F   | 5.7          | 5                     | 1                            | 3                                              |
| 4                         | M   | 5.7          | 3-1/2                 | 2                            | 3-1/2                                          |
| 5                         | M   | 7.1          | 4                     | 3                            | 1-1/2                                          |
| 6 **                      | F   | 6.8          | 5-1/2                 | 1                            | -                                              |
| 7                         | F   | 7.9          | 4-1/2                 | 3                            | 4                                              |
| 8                         | M   | 8.6          | 5-1/2                 | 3                            | 4-1/2                                          |
| (Ft. Wayne, Unit 2)       |     |              |                       |                              |                                                |
| 9 ****                    | F   | 11.0         | 10                    | 1                            | 2                                              |
| 10 *                      | F   | 11.3         | 8                     | 3                            | 2-1/2                                          |
| 11 **                     | M   | 11.5         | 8-1/2                 | 3                            | Birth **                                       |
| 12 **                     | F   | 9.1          | 8                     | 1                            | 2-1/2                                          |
| 13 *                      | F   | 13.1         | 11                    | 2                            | 1-1/2                                          |
| 14                        | F   | 12.0         | 9                     | 3                            | 4-1/2                                          |
| 15 *                      | M   | 10.0         | 7                     | 3                            | 2-1/2                                          |
| 16 ***                    | F   | 12.6         | 9-1/2                 | 3                            | 1-1/2                                          |
| 17                        | M   | 11.4         | 8                     | 3                            | 7                                              |
| 18                        | M   | 8.2          | 7                     | 1                            | 7                                              |
| (Muncie, Unit 3)          |     |              |                       |                              |                                                |
| 19                        | M   | 9.9          | 5                     | 5                            | 2                                              |
| 20                        | F   | 6.5          | 5                     | 1                            | 1                                              |
| 21                        | F   | 8.2          | 4                     | 4                            | 1                                              |
| 22                        | M   | 6.6          | 3-1/2                 | 3                            | 9 Months                                       |
| 23                        | F   | 6.0          | 5                     | 1                            | 2                                              |
| 24                        | F   | 5.6          | 4-1/2                 | 1                            | 2-1/2                                          |
| 25                        | M   | 7.4          | 5                     | 2                            | 2-1/2                                          |

\* Attended School for the Deaf.

\*\* Additional Physical Handicap (Handicaps Enumerated in Appendix 3)

\*\*\* Deafness Present in Immediate Family

\*\*\*\*Sisters, Twin Sisters



## Appendix 4 (con't)

## (Muncie, Unit 4)

|         |   |      |       |   |       |
|---------|---|------|-------|---|-------|
| 26 **** | F | 10.4 | 7     | 3 | --    |
| 27 **** | F | 10.4 | 7     | 3 | --    |
| 28      | M | 11.8 | 8-1/2 | 3 | 8     |
| 29 **   | F | 11.2 | 7     | 4 | 2-1/2 |
| 30      | M | 10.0 | 5-1/2 | 4 | 5     |
| 31      | M | 9.0  | 7     | 2 | 6-1/2 |
| 32      | M | 10.2 | 8     | 2 | 7-1/2 |
| 33      | F | 11.0 | 8     | 3 | 7     |

## (Evansville, Unit 5)

|        |   |      |       |    |       |
|--------|---|------|-------|----|-------|
| 34     | F | 15.3 | 5     | 10 | 1-1/2 |
| 35     | M | 10.1 | 5-1/2 | 5  | 2     |
| 36 **  | M | 11.7 | 6     | 5  | 5     |
| 37 **  | F | 12.5 | 6     | 6  | 6     |
| 38     | F | 13.5 | 6     | 7  | 4     |
| 39     | F | 16.0 | 11    | 5  | 5     |
| 40 *** | F | 14.4 | 5     | 9  | --    |
| 41     | M | 17.3 | 12    | 5  | 5     |
| 42     | M | 9.3  | 5     | 4  | 2-1/2 |

## (So. Bend, Unit 6)

|        |   |      |       |   |       |
|--------|---|------|-------|---|-------|
| 43     | F | 6.1  | 2     | 4 | 2-1/2 |
| 44     | F | 6.2  | 3     | 3 | 3     |
| 45     | M | 7.7  | 4-1/2 | 3 | 1-1/2 |
| 46 **  | M | 9.11 | 8-1/2 | 1 | 8     |
| 47 **  | M | 9.9  | 6-1/2 | 3 | 4     |
| 48     | F | 6.9  | 3-1/2 | 3 | 3     |
| 49 *   | F | 8.11 | 7-1/2 | 1 | 3     |
| 50 *** | F | 6.5  | 3-1/2 | 3 | 2     |
| 51     | F | 5.7  | 4-1/2 | 1 | 3     |

## (So. Bend, Unit 7)

|       |   |      |       |   |       |
|-------|---|------|-------|---|-------|
| 52    | M | 7.3  | 5     | 2 | 5     |
| 53    | F | 13.3 | 9     | 4 | 8     |
| 54    | M | 8.0  | 6-1/2 | 3 | 6     |
| 55    | F | 11.1 | 7-1/2 | 3 | 4-1/2 |
| 56    | F | 11.4 | 7     | 4 | 3     |
| 57 ** | F | 10.0 | 7     | 3 | 6-1/2 |
| 58    | M | 12.9 | 6-1/2 | 6 | 2-1/2 |
| 59    | F | 14.7 | 6     | 8 | 4-1/2 |



## Appendix 4 (con't)

|        |   |      |       |     |       |
|--------|---|------|-------|-----|-------|
| 60     | M | 7.7  |       | 1/2 | 7     |
| 61     | F | 13.3 | 11    | 2   | 2-1/2 |
| 62     | F | 8.11 | 6-1/2 | 2   | 3     |
| 63 *** | F | 9.4  | 5     | 3   | 1-1/2 |

(Ft. Wayne State School, Unit 8)

|         |   |      |       |       |
|---------|---|------|-------|-------|
| 64      | M | 15.1 | 6.11  | 8.2   |
| 65 **   | F | 19.9 | 5.10  | 13.11 |
| 66 **   | M | 16.6 | 10.5  | 6.1   |
| 67      | F | 13.7 | 9.11  | 3.8   |
| 68      | M | 9.7  | 6.3   | 3.4   |
| 69 **** | F | 17.7 | 14.1  | 3.8   |
| 70 **** | F | 15.1 | 11.5  | 3.8   |
| 71 **   | M | 23.2 | 19.7  | 3.7   |
| 72 **   | F | 20.1 | 12.10 | 7.3   |
| 73      | F | 19.5 | 17.11 | 1.6   |
| 74      | M | 13.8 | 7.5   | 6.3   |
| 75      | F | 14.2 | 9.8   | 4.6   |
| 76      | M | 16.3 | 9.2   | 7.1   |
| 77      | F | 17.4 | 11.5  | 5.11  |
| 78 **   | F | 12.6 | 6.6   | 6.0   |

## Appendix 5

Handicaps in Addition to Auditory Impairment Found  
in Special Classroom Group Subjects

| <u>Subject #</u> | <u>Sex</u> | <u>Age</u> | <u>Diagnosed Disorder Other Than Hearing</u>              |
|------------------|------------|------------|-----------------------------------------------------------|
| 6                | F          | 6.8        | Brain Injury Neurosensory Lesion (Cerebral Cortex)        |
| 11               | M          | 11.5       | Bilateral Congenital Atresia of External Ear and Canal    |
| 12               | F          | 9.1        | Mentally Retarded                                         |
| 14               | F          | 12.0       | Diabetic and Absence of Oil Glands                        |
| 17               | M          | 11.4       | Cerebral Degeneration                                     |
| 21               | F          | 8.2        | Mentally Retarded                                         |
| 29               | F          | 10.3       | Mild Aphasia                                              |
| 36               | M          | 11.7       | Partially Sighted in Right Eye                            |
| 37               | F          | 12.5       | Poliomyelitis (Monoplegia)                                |
| 46               | M          | 9.11       | Cerebral Palsy (Quadreplegia)                             |
| 47               | M          | 9.9        | Brain Damage                                              |
| 57               | F          | 10.0       | Cleft Palate (repaired), Club Foot (surgically corrected) |
| 65               | F          | 19.9       | Congenital Unilateral Atresia (Right Ear)                 |
| 66               | M          | 16.6       | Congenital Cerebral Spasticity                            |
| 71               | M          | 23.2       | Heart Condition                                           |



## Appendix 6

Comparison, I. Q. Data, of Subject Samples Drawn for Special Classroom  
Section of the Study: Consideration of Individual Subjects

| Subject             | Age  | Sex | Test                                   | I. Q. Score<br>and/or Description |
|---------------------|------|-----|----------------------------------------|-----------------------------------|
| (Ft. Wayne, Unit 1) |      |     |                                        |                                   |
| 1 *                 |      |     |                                        |                                   |
| 2                   | 7.2  | M   | Leiter International                   | Normal Intelligence               |
| 3                   | 5.7  | F   | Leiter International                   | Normal Intelligence               |
| 4                   | 5.7  | M   | Stanford Binet (Parts)                 | Normal Intelligence               |
| 5                   | 7.1  | M   | Leiter International                   | Normal Intelligence               |
| 6                   | 6.8  | F   | Leiter International<br>(Parts)        | Below Average                     |
| 7                   | 7.9  | F   | Leiter International                   | Above Average                     |
| 8                   | 8.6  | M   | Leiter International                   | Normal Intelligence               |
| (Ft. Wayne, Unit 2) |      |     |                                        |                                   |
| 9                   | 11.0 | F   | Leiter International                   | Normal Intelligence               |
| 10                  | 11.3 | F   | Leiter International                   | Normal Intelligence               |
| 11                  | 11.5 | M   | Leiter International                   | Normal Intelligence               |
| 12                  | 9.1  | F   | Arthur Scale of<br>Performance Test II | I. Q. 72                          |
| 13                  | 13.1 | F   | Arthur Point Scale                     | I. Q. 95                          |
| 14                  | 12.0 | F   | Leiter International                   | I. Q. 78                          |
| 15                  | 10.0 | M   | Leiter International                   | Normal Intelligence               |
| 16                  | 12.6 | F   | Hiskey-Nebraska                        | Normal Intelligence               |
| 17                  | 11.4 | M   | Hiskey-Nebraska                        | Normal Intelligence               |
| 18                  | 8.2  | M   | Leiter International                   | Normal Intelligence               |
| (Muncie, Unit 3)    |      |     |                                        |                                   |
| 19                  | 9.9  | M   | Leiter International                   | Normal Intelligence               |
| 20                  | 6.5  | F   | Leiter International                   | Normal Intelligence               |
| 21                  | 8.2  | F   | Leiter International                   | Normal Intelligence               |
| 22                  | 6.6  | M   | Leiter International                   | Normal Intelligence               |
| 23                  | 6.0  | F   | Arthur Point Scale                     | I. Q. 100                         |
| 24                  | 4.6  | F   | Arthur Point Scale                     | I. Q. 72                          |
| 25                  | 7.4  | M   | Arthur Point Scale                     | I. Q. 82                          |

\* No test results reported



## Appendix 6 (con't)

## (Muncie, Unit 4)

|    |      |   |                      |           |
|----|------|---|----------------------|-----------|
| 26 | 10.4 | F | Arthur Point Scale   | I. Q. 79  |
| 27 | 10.4 | F | Stanford Binet       | I. Q. 77  |
| 28 | 11.8 | M | Arthur Point Scale   | I. Q. 87  |
| 29 | 10.3 | F | Leiter International | I. Q. 90  |
| 30 | 10.0 | M | Arthur Point Scale   | I. Q. 82  |
| 31 | 9.0  | M | Stanford Binet       | I. Q. 103 |
| 32 | 10.2 | M | Arthur Point Scale   | I. Q. 96  |
| 33 | 11.0 | F | Arthur Point Scale   | I. Q. 98  |

## (Evansville, Unit 5)

|    |       |   |                          |           |
|----|-------|---|--------------------------|-----------|
| 34 | 15.3  | F | Columbia Mental Maturity | I. Q. 84  |
| 35 | 10.11 | M | Columbia Mental Maturity | I. Q. 85  |
| 36 | 11.7  | M | Columbia Mental Maturity | I. Q. 93  |
| 40 | 14.4  | F | Columbia Mental Maturity | I. Q. 101 |
| 41 | 17.3  | M | Columbia Mental Maturity | I. Q. 77  |
| 42 | 9.3   | M | Columbia Mental Maturity | Very High |

## (So. Bend, Unit 6)

|    |      |   |                      |                       |
|----|------|---|----------------------|-----------------------|
| 43 | 6.1  | F | Arthur Point Scale   | Normal Intelligence   |
| 44 | 6.2  | F | Arthur Point Scale   | Normal Intelligence   |
| 45 | 7.7  | M | Arthur Point Scale   | Normal Intelligence   |
| 46 | 9.11 | M | WISC                 | Normal Intelligence   |
| 47 | 9.8  | M | Arthur Point Scale   | Normal Intelligence   |
| 48 | 6.9  | F | Arthur Point Scale   | Superior Intelligence |
| 49 | 8.10 | F | Leiter International | Dull Normal           |
| 50 | 6.4  | F | Arthur Point Scale   | Normal Intelligence   |
| 51 | 5.7  | F | Merrill-Palmer       | Normal Intelligence   |

## (So. Bend, Unit 7)

|    |      |   |                |                       |
|----|------|---|----------------|-----------------------|
| 52 | 7.3  | M | Stanford Binet | I. Q. 107             |
| 53 | 13.3 | F | Stanford Binet | Dull Normal           |
| 54 | 8.0  | M | Stanford Binet | Normal Intelligence   |
| 55 | 11.1 | F | Stanford Binet | Superior Intelligence |
| 56 | 11.4 | F | Stanford Binet | Above Average         |
| 57 | 10.0 | F | Stanford Binet | I. Q. 112             |
| 58 | 12.9 | M | WISC           | I. Q. 112             |
| 59 | 14.7 | F | WISC           | I. Q. 103             |
| 60 | 7.7  | M | Stanford Binet | I. Q. 90              |
| 61 | 13.3 | F | WISC           | I. Q. 92              |

## Appendix 6 (con't)

|    |      |   |                |           |
|----|------|---|----------------|-----------|
| 62 | 8.11 | F | WISC           | I. Q. 110 |
| 63 | 9.0  | F | Stanford Binet | I. Q. 97  |

(Ft. Wayne State School, Unit 8)

|    |      |   |                    |          |
|----|------|---|--------------------|----------|
| 64 | 15.1 | M | Arthur Point Scale | I. Q. 48 |
| 65 | 19.9 | F | Stanford Binet     | I. Q. 37 |
| 66 | 16.6 | M | Stanford Binet     | I. Q. 41 |
| 67 | 13.7 | F | WISC               | I. Q. 66 |
| 68 | 9.7  | M | Arthur Point Scale | I. Q. 64 |
| 69 | 17.9 | M | WISC               | I. Q. 50 |
| 70 | 15.1 | F | Stanford Binet     | I. Q. 58 |
| 71 | 23.2 | M | Wechsler-Bellevue  | I. Q. 63 |
| 72 | 20.1 | F | Stanford Binet     | I. Q. 58 |
| 73 | 19.5 | F | WISC               | I. Q. 54 |
| 74 | 13.8 | M | Stanford Binet     | I. Q. 41 |
| 75 | 14.2 | F | Stanford Binet     | I. Q. 68 |
| 76 | 16.3 | M | Stanford Binet     | I. Q. 45 |
| 77 | 17.4 | F | Wechsler-Bellevue  | I. Q. 49 |



# PICTOGRAPHIC SELF RATING SCALE

PROFESSOR EINAR R. RYDEN  
Department of Psychology, Purdue University

NAME \_\_\_\_\_ SCHOOL \_\_\_\_\_

AGE — YEARS \_\_\_\_\_ MONTHS \_\_\_\_\_ INSTRUCTOR \_\_\_\_\_

CITY \_\_\_\_\_ STATE \_\_\_\_\_ DATE \_\_\_\_\_

**INSTRUCTIONS:** Look at all of the pictures for each item; then choose the picture which is most like you. Circle the number of your choice on the answer sheet and go on to the next item. *Please do not write on this booklet.*

Item 1

## READING YOUR TEXTBOOK



1. It's a snap



2. Not too hard



3. Sometimes easy, sometimes hard



4. Rather hard



5. It's pretty tough

Item 2

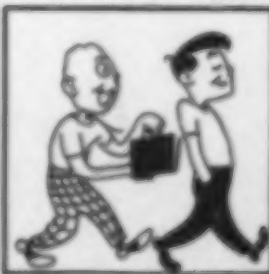
## GETTING STARTED ON CLASS WORK



1. Don't even try to start it



2. Have to be pushed into it



3. Start it but like to get help



4. Get along without help



5. Do extra work on your own

Item 3

## PAYING ATTENTION



1. Pay very close attention



2. Try with difficulty to be attentive



3. Get bored in class



4. Do other work in class



5. Create a disturbance in class

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Experimental Form A

(Continued)

## Appendix 8

## Hearing Loss Data for Experimental and Control Public School Subjects

| Monaural<br>Hearing<br>Loss<br>Level | Grade | Race  | <u>Experimental</u> |        | <u>Control</u> |        | Race<br>Total | Grade<br>Total |
|--------------------------------------|-------|-------|---------------------|--------|----------------|--------|---------------|----------------|
|                                      |       |       | Male                | Female | Male           | Female |               |                |
| 1)<br><br>Border-<br>Line<br>Loss    | 4     | White | 1                   | 0      | 0              | 0      | 1             | 2              |
|                                      |       | Negro | 0                   | 0      | 1              | 0      | 1             |                |
|                                      | 5     | W     | 0                   | 1      | 0              | 1      | 2             | 2              |
|                                      |       | N     | 0                   | 0      | 0              | 0      | 0             |                |
|                                      | 6     | W     | 0                   | 1      | 1              | 0      | 2             | 2              |
|                                      |       | N     | 0                   | 0      | 0              | 0      | 0             |                |
|                                      | 7     | W     | 3                   | 1      | 1              | 3      | 8             | 8              |
|                                      |       | N     | 0                   | 0      | 0              | 0      | 0             |                |
|                                      | Total |       | 4                   | 3      | 3              | 4      | 14            | 14             |
|                                      |       |       |                     |        |                |        |               |                |
| 2)<br><br>Mild<br>Loss               | 4     | W     | 4                   | 1      | 4              | 3      | 12            | 18             |
|                                      |       | N     | 1                   | 3      | 2              | 0      | 6             |                |
|                                      | 5     | W     | 4                   | 1      | 4              | 1      | 10            | 12             |
|                                      |       | N     | 1                   | 0      | 0              | 1      | 2             |                |
|                                      | 6     | W     | 3                   | 1      | 2              | 2      | 8             | 10             |
|                                      |       | N     | 0                   | 1      | 0              | 1      | 2             |                |
|                                      | 7     | W     | 4                   | 0      | 2              | 3      | 9             | 12             |
|                                      |       | N     | 2                   | 0      | 1              | 0      | 3             |                |
|                                      | Total |       | 19                  | 7      | 15             | 11     | 52            | 52             |
|                                      |       |       |                     |        |                |        |               |                |
| 3)<br><br>Moderate<br>Loss           | 4     | W     | 1                   | 2      | 2              | 1      | 6             | 6              |
|                                      |       | N     | 0                   | 0      | 0              | 0      | 0             |                |
|                                      | 5     | W     | 1                   | 4      | 3              | 3      | 11            | 12             |
|                                      |       | N     | 1                   | 0      | 0              | 0      | 1             |                |
|                                      | 6     | W     | 2                   | 0      | 1              | 1      | 4             | 4              |
|                                      |       | N     | 0                   | 0      | 0              | 0      | 0             |                |



## Appendix 8 (con't)

|          |   | W | 4  | 2  | 7  | 1  | 14 |    |
|----------|---|---|----|----|----|----|----|----|
|          |   | N | 1  | 1  | 0  | 0  | 2  | 16 |
| Total    |   |   | 10 | 9  | 13 | 6  | 38 | 38 |
| 4)       |   | W | 0  | 0  | 0  | 1  | 1  |    |
|          | 4 | N | 0  | 2  | 1  | 0  | 3  | 4  |
| Severe   |   | W | 0  | 2  | 1  | 1  | 4  |    |
| Loss     | 5 | N | 0  | 0  | 0  | 0  | 0  | 4  |
|          |   | W | 0  | 0  | 0  | 0  | 0  |    |
|          | 6 | N | 0  | 0  | 0  | 0  | 0  | 0  |
|          |   | W | 0  | 3  | 2  | 1  | 6  |    |
|          | 7 | N | 0  | 0  | 0  | 0  | 0  | 6  |
| Total    |   |   | 0  | 7  | 4  | 3  | 14 | 14 |
| 5)       |   | W | 1  | 1  | 0  | 2  | 4  |    |
|          | 4 | N | 0  | 0  | 0  | 0  | 0  | 4  |
| Profound |   | W | 1  | 3  | 1  | 3  | 8  |    |
| Loss     | 5 | N | 1  | 1  | 1  | 1  | 4  | 12 |
|          |   | W | 1  | 2  | 2  | 1  | 6  |    |
|          | 6 | N | 0  | 1  | 0  | 1  | 2  | 8  |
|          |   | W | 3  | 4  | 1  | 6  | 14 |    |
|          | 7 | N | 0  | 1  | 1  | 0  | 2  | 16 |
| Total    |   |   | 7  | 13 | 6  | 14 | 40 | 40 |

## Appendix 8 (con't)

| Binaural<br>Hearing<br>Loss<br>Level | Grade | Race  | <u>Experimental</u> |        | <u>Control</u> |        | Race<br>Total | Grade<br>Total |
|--------------------------------------|-------|-------|---------------------|--------|----------------|--------|---------------|----------------|
|                                      |       |       | Male                | Female | Male           | Female |               |                |
| 1)<br><br>Mild<br>Loss               | 4     | White | 1                   | 0      | 1              | 0      | 2             | 2              |
|                                      |       | Negro | 0                   | 0      | 0              | 0      | 0             |                |
|                                      | 5     | W     | 4                   | 4      | 3              | 3      | 14            | 16             |
|                                      |       | N     | 0                   | 0      | 1              | 1      | 2             |                |
|                                      | 6     | W     | 1                   | 2      | 2              | 1      | 6             | 10             |
|                                      |       | N     | 2                   | 0      | 1              | 1      | 4             |                |
|                                      | 7     | W     | 1                   | 1      | 2              | 1      | 5             | 6              |
|                                      |       | N     | 0                   | 1      | 0              | 0      | 1             |                |
|                                      | Total |       | 9                   | 8      | 10             | 7      | 34            | 34             |
|                                      |       |       |                     |        |                |        |               |                |
| 2)<br><br>Moderate<br>Loss           | 4     | W     | 3                   | 0      | 1              | 2      | 6             | 8              |
|                                      |       | N     | 0                   | 1      | 0              | 1      | 2             |                |
|                                      | 5     | W     | 3                   | 0      | 0              | 10     | 21            | 28             |
|                                      |       | N     | 2                   | 1      | 2              | 2      | 7             |                |
|                                      | 6     | W     | 0                   | 2      | 1              | 1      | 4             | 10             |
|                                      |       | N     | 1                   | 2      | 0              | 3      | 6             |                |
|                                      | 7     | W     | 1                   | 1      | 2              | 2      | 6             | 14             |
|                                      |       | N     | 2                   | 3      | 1              | 2      | 8             |                |
|                                      | Total |       | 12                  | 18     | 7              | 23     | 60            | 60             |
|                                      |       |       |                     |        |                |        |               |                |
| 3)<br><br>Severe<br>Loss             | 4     | W     | 4                   | 1      | 2              | 4      | 11            | 14             |
|                                      |       | N     | 2                   | 0      | 0              | 1      | 3             |                |
|                                      | 5     | W     | 2                   | 1      | 2              | 1      | 6             | 8              |
|                                      |       | N     | 1                   | 0      | 0              | 1      | 2             |                |
|                                      | 6     | W     | 1                   | 0      | 1              | 0      | 2             | 4              |
|                                      |       | N     | 1                   | 0      | 1              | 0      | 2             |                |



## Appendix 8 (con't)

|                        |       |   | W | 1  | 1 | 0 | 1 | 3  |    |
|------------------------|-------|---|---|----|---|---|---|----|----|
|                        | 7     | N |   | 0  | 0 | 1 | 0 | 1  | 4  |
|                        | Total |   |   | 12 | 3 | 7 | 8 | 30 | 30 |
| 4)<br>Profound<br>Loss |       | W | 0 | 2  | 1 | 1 | 4 |    |    |
|                        | 4     | N | 0 | 0  | 0 | 0 | 0 |    | 4  |
|                        |       | W | 2 | 1  | 1 | 2 | 6 |    |    |
|                        | 5     | N | 0 | 0  | 0 | 0 | 0 |    | 6  |
|                        |       | W | 0 | 1  | 0 | 1 | 2 |    |    |
|                        | 6     | N | 0 | 1  | 0 | 1 | 2 |    | 4  |
|                        |       | W | 0 | 2  | 2 | 0 | 4 |    |    |
|                        | 7     | N | 0 | 0  | 0 | 0 | 0 |    | 4  |
|                        | Total |   |   | 2  | 7 | 4 | 5 | 18 | 18 |

## Appendix 9

## Sociometric Questionnaire

Name \_\_\_\_\_

Grade \_\_\_\_\_

Teacher \_\_\_\_\_

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_

Teacher's Instructions:

Children are to nominate their best friends  
in the class according to first, second, and third  
choices.



## Appendix 9 (con't)

## Social Distance Questionnaire Items

Name \_\_\_\_\_

Grade \_\_\_\_\_

Teacher \_\_\_\_\_

1. Would like to have him (or her) as one of my best friends.
2. Would like to have him (or her) in my group but not as a close friend.
3. Would like to be with him (or her) once in a while but not often or for long at a time.
4. Don't mind his (or her) being in our room but I don't want to have anything to do with him.
5. Wish he (or she) weren't in our room.

## Appendix 9 (con't)

Guess Who Ratings

1. Who likes to talk to other boys and girls?
2. Who is usually silent, quiet, and seldom talks to others?
3. Who pays attention and listens carefully to others when they talk?
4. Who does not pay attention and is not very interested in what others say?
5. Who speaks plainly and can always be understood easily?
6. Who does not speak plainly and sometimes has to repeat so others can understand?
7. Who talks loudly most of the time?
8. Who talks too softly and is sometimes hard to understand?
9. Who has a habit or mannerism that we dislike?
10. Who does not have any bad habits or mannerisms?
11. Who has a problem that makes school a little difficult at times?
12. Who does not have any problems that make school difficult?

## Appendix 9 (con't)

## Self Report

Name: \_\_\_\_\_

Grade: \_\_\_\_\_

Teacher: \_\_\_\_\_

|  | <u>All the Time</u> | <u>Sometimes</u> | <u>Not Very Often</u> |
|--|---------------------|------------------|-----------------------|
|--|---------------------|------------------|-----------------------|

- |                                   |       |       |       |
|-----------------------------------|-------|-------|-------|
| 1. I talk to other boys and girls | _____ | _____ | _____ |
|-----------------------------------|-------|-------|-------|

- |                                                                  |       |       |       |
|------------------------------------------------------------------|-------|-------|-------|
| 2. I pay attention and listen carefully to others when they talk | _____ | _____ | _____ |
|------------------------------------------------------------------|-------|-------|-------|

- |                                                       |       |       |       |
|-------------------------------------------------------|-------|-------|-------|
| 3. Other boys and girls can understand me when I talk | _____ | _____ | _____ |
|-------------------------------------------------------|-------|-------|-------|

- |                      |       |       |       |
|----------------------|-------|-------|-------|
| 4. I talk too loudly | _____ | _____ | _____ |
|----------------------|-------|-------|-------|

- |                      |       |       |       |
|----------------------|-------|-------|-------|
| 5. I talk too softly | _____ | _____ | _____ |
|----------------------|-------|-------|-------|

- |                                                    |       |       |       |
|----------------------------------------------------|-------|-------|-------|
| 6. I have a habit that other boys and girls notice | _____ | _____ | _____ |
|----------------------------------------------------|-------|-------|-------|

- |                                                                                 |       |       |       |
|---------------------------------------------------------------------------------|-------|-------|-------|
| 7. I have a special problem that bothers me and makes school a little difficult | _____ | _____ | _____ |
|---------------------------------------------------------------------------------|-------|-------|-------|



## Appendix 9

## COWELL SOCIAL BEHAVIOR TREND INDEX (Form A)

| Behavior Trends                                                                                                     | Descriptive of the Student |                  |                          |                       |
|---------------------------------------------------------------------------------------------------------------------|----------------------------|------------------|--------------------------|-----------------------|
|                                                                                                                     | Markedly<br>(+3)           | Somewhat<br>(+2) | Only<br>Slightly<br>(+1) | Not<br>at All<br>(+0) |
| 1. Enters heartily and with enjoyment into the spirit of social intercourse . . . . .                               |                            |                  |                          |                       |
| 2. Frank; talkative and sociable, does not stand on ceremony . . . . .                                              |                            |                  |                          |                       |
| 3. Self-confident and self-reliant, tends to take success for granted, strong initiative, prefers to lead . . . . . |                            |                  |                          |                       |
| 4. Quick and decisive in movement, pronounced or excessive energy output . . . . .                                  |                            |                  |                          |                       |
| 5. Prefers group activities, work or play; not easily satisfied with individual projects . . . . .                  |                            |                  |                          |                       |
| 6. Adaptable to new situations, makes adjustments readily, welcomes change . . . . .                                |                            |                  |                          |                       |
| 7. Is self-composed, seldom shows signs of embarrassment . . . . .                                                  |                            |                  |                          |                       |
| 8. Tends to elation of spirits, seldom gloomy or moody . . . . .                                                    |                            |                  |                          |                       |
| 9. Seeks a broad range of friendships, not selective or exclusive in games and the like . . . . .                   |                            |                  |                          |                       |
| 10. Hearty and cordial, even to strangers, forms acquaintanceships very easily . . . . .                            |                            |                  |                          |                       |

Date: \_\_\_\_\_ Grade: \_\_\_\_\_

School: \_\_\_\_\_ Age: \_\_\_\_\_

Last Name

First Name

Describer: \_\_\_\_\_

INSTRUCTION:-- Think carefully of the student's behavior in group situations and check each behavior trend according to its degree of descriptiveness.

## COWELL SOCIAL BEHAVIOR TREND INDEX (Form B)

| Behavior Trends                                                                                                            | Descriptive of the Student |                  |                          |                       |
|----------------------------------------------------------------------------------------------------------------------------|----------------------------|------------------|--------------------------|-----------------------|
|                                                                                                                            | Markedly<br>(-3)           | Somewhat<br>(-2) | Only<br>Slightly<br>(-1) | Not<br>at all<br>(-0) |
| 1. Somewhat prudish, awkward, easily embarrassed in his social contacts . . . . .                                          |                            |                  |                          |                       |
| 2. Secretive, seclusive, not inclined to talk unless spoken to . . . . .                                                   |                            |                  |                          |                       |
| 3. Lacking in self-confidence and initiative, a follower . . . . .                                                         |                            |                  |                          |                       |
| 4. Slow in movement, deliberative or perhaps indecisive. Energy output moderate or deficient . . . . .                     |                            |                  |                          |                       |
| 5. Prefers to work and play alone, tends to avoid group activities . . . . .                                               |                            |                  |                          |                       |
| 6. Shrinks from making new adjustments, prefers the habitual to the stress of reorganization required by the new . . . . . |                            |                  |                          |                       |
| 7. Is self-conscious, easily embarrassed, timid or "bashful" . . . . .                                                     |                            |                  |                          |                       |
| 8. Tends to depression, frequently gloomy or moody . . . . .                                                               |                            |                  |                          |                       |
| 9. Shows preference for a narrow range of intimate friends and tends to exclude others from his association . . . . .      |                            |                  |                          |                       |
| 10. Reserved and distant except to intimate friends, does not form acquaintanceships readily . . . . .                     |                            |                  |                          |                       |

Date: \_\_\_\_\_ Grade: \_\_\_\_\_

School: \_\_\_\_\_ Age: \_\_\_\_\_

Last Name

First Name

Describer: \_\_\_\_\_

INSTRUCTION:-- Think carefully of the student's behavior in group situations and check each behavior trend according to its degree of descriptiveness.



## Appendix 9 (con't)

## Parent Questionnaire

1. It is often difficult to explain about our child's hearing loss to others (relatives, strangers, etc.).

Often true ( ) Sometimes true ( ) Seldom true ( ) Never true ( )

2. Our child is left out of games and groups because others don't want to explain what is going on.

Often true ( ) Sometimes true ( ) Seldom true ( ) Never true ( )

3. Our child doesn't take his part or stick up for himself in group situations.

Often true ( ) Sometimes true ( ) Seldom true ( ) Never true ( )

4. Our child has difficulty in getting problems across and explaining how he feels about things.

Often true ( ) Sometimes true ( ) Seldom true ( ) Never true ( )

5. Our child excludes some children in preference for others and tends to be cliquish.

Often true ( ) Sometimes true ( ) Seldom true ( ) Never true ( )

6. Our child worries about saying the right thing and says what will please us rather than saying what he really thinks.

Often true ( ) Sometimes true ( ) Seldom true ( ) Never true ( )

7. Our child has greater need for approval than if his hearing was normal.

Often true ( ) Sometimes true ( ) Seldom true ( ) Never true ( )

8. Our child is more interested in talking himself than listening to what others have to say. He often interrupts while others are talking.

Often true ( ) Sometimes true ( ) Seldom true ( ) Never true ( )

9. Others speak louder and use more gestures when they realize our child has a hearing loss.

Often true ( ) Sometimes true ( ) Seldom true ( ) Never true ( )



## Appendix 9 (con't)

10. Most people regard our child as handicapped.

Often true ( ) Sometimes true ( ) Seldom true ( ) Never true ( )

11. Our child requires more supervision than a normal hearing child.

Often true ( ) Sometimes true ( ) Seldom true ( ) Never true ( )

12. Our child is less able to take care of himself because of his hearing loss.

Often true ( ) Sometimes true ( ) Seldom true ( ) Never true ( )

13. We have less fun with our child than we would if his hearing were normal.

Often true ( ) Sometimes true ( ) Seldom true ( ) Never true ( )

14. Many of our child's problems are based on his hearing loss.

Often true ( ) Sometimes true ( ) Seldom true ( ) Never true ( )

## Appendix 9 (con't)

## Public Classroom Program

Parent Questionnaire

Pupil's name \_\_\_\_\_ Birthday \_\_\_\_\_  
 Grade \_\_\_\_\_ School \_\_\_\_\_  
 Mother's occupation \_\_\_\_\_ Age \_\_\_\_\_  
 Highest grade attended in school \_\_\_\_\_  
 Father's occupation \_\_\_\_\_ Age \_\_\_\_\_  
 Highest grade attended in school \_\_\_\_\_  
 Family living at home: Father \_\_\_\_\_ Mother \_\_\_\_\_ Number of brothers \_\_\_\_\_  
 Number of sisters \_\_\_\_\_ Others living at home \_\_\_\_\_  
 Pupil has \_\_\_\_\_ older brothers and sisters and \_\_\_\_\_ younger brothers and sisters. Pupil has attended \_\_\_\_\_ (number) different schools.

PART I

|                                             | Never | Some-<br>times | Most<br>time | Always |
|---------------------------------------------|-------|----------------|--------------|--------|
| 1. Is popular with other boys and girls.    | _____ | _____          | _____        | _____  |
| 2. Misunderstands instructions.             | _____ | _____          | _____        | _____  |
| 3. Strains to hear person talking.          | _____ | _____          | _____        | _____  |
| 4. Watches face of speaker closely.         | _____ | _____          | _____        | _____  |
| 5. Seems interested in conversation.        | _____ | _____          | _____        | _____  |
| 6. Seems restless or tires easily.          | _____ | _____          | _____        | _____  |
| 7. Angers easily.                           | _____ | _____          | _____        | _____  |
| 8. Understands other children when playing. | _____ | _____          | _____        | _____  |
| 9. Plays radio or TV too loud.              | _____ | _____          | _____        | _____  |

PART II

1. How is he doing generally? (Home, school, etc.) \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 2. What are his best qualities? \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 3. Which qualities does he need to improve? \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 4. How would you change things for him if you could? \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



## Appendix 9 (con't)

5. What are your hopes for him? (School work, etc.) \_\_\_\_\_

6. If a hearing loss is present does this affect his behavior? (Home, School, etc.) \_\_\_\_\_

7. List any special problems. \_\_\_\_\_

8. What special consideration do you give him at home? \_\_\_\_\_

9. Has he/she ever received any of the following: lip reading \_\_\_\_\_,  
speech therapy \_\_\_\_\_, psychological evaluation \_\_\_\_\_ physical therapy \_\_\_\_\_?

**PART III**

1. How long have you been aware of his/her hearing difficulty? \_\_\_\_\_

2. What serious illnesses occurred during the following periods?

During pregnancy: \_\_\_\_\_

During birth: \_\_\_\_\_

Since birth: \_\_\_\_\_

## Appendix 9 (con't)

## Special Classroom Program

## Parents' Report

- I. Indicate how your child performs in the following areas of development, adjustment, and relationships by noting for each item: Never (0), Sometimes (+), or Frequently (\*\*).

1. accepting limits
2. accepting routines
3. initiating activities
4. enjoying new activities
5. becoming part of a group
6. standing up for his own rights
7. enjoying intellectual activities
8. enjoying nonintellectual activities
9. developing greater self-confidence
10. acting his own age
11. becoming less self-centered
12. learning to relax
13. learning to take turns
14. sharing adult's attention
15. sharing possessions and equipment
16. separation from parents
17. accepting criticism
18. solving his own problems
19. finishing what he starts
20. accepting failure and frustration
21. less dependence on reassurance
22. overcoming fears
23. developing good work habits
24. working independently

- II. In which of the following areas of social, emotional, and intellectual growth do you feel your child needs to make improvement? Needs no improvement-adequate for age (0). Needs some improvement (+). Needs decided improvement (\*\*).

25. enjoying other children
26. accepting new people
27. being more cooperative
28. respecting rights of others
29. ability to "take it"
30. increased spontaneity

## Appendix 9 (con't)

## Special Classroom Program

## Parent Interview

| <u>Interview Question</u>                                                                 | <u>Descriptive Scale Values</u> |                   |                               |                   |
|-------------------------------------------------------------------------------------------|---------------------------------|-------------------|-------------------------------|-------------------|
|                                                                                           | <u>4</u>                        | <u>3</u>          | <u>2</u>                      | <u>1</u>          |
| 1. What kind of progress is he making in his academic subjects and special work?          | Poor                            | Fair              | Good                          | Excellent         |
| 2. How is his social adjustment at school?                                                | Poor                            | Fair              | Good                          | Excellent         |
| 3. How is his social adjustment at home?                                                  | Poor                            | Fair              | Good                          | Excellent         |
| 4. How is his social adjustment in the neighborhood play groups?                          | Poor                            | Fair              | Good                          | Excellent         |
| 5. What are some of his best and worst personal qualities and habits?                     | Markedly Negative               | Somewhat Negative | Equally Negative and Positive | Markedly Positive |
| 6. What are some of the activities you do not let him participate in?                     | Many                            | Some              | Few                           | None              |
| 7. How many neighborhood children does he play with?                                      | None                            | Few               | Some                          | Many              |
| 8. Ideally, how would you change your home and family life to make things better for him? | Many                            | Some              | Few                           | No                |



## Appendix 9 (con't)

| Interview Question                                                                                                                | Descriptive Scale Values |                      |                 |                |
|-----------------------------------------------------------------------------------------------------------------------------------|--------------------------|----------------------|-----------------|----------------|
|                                                                                                                                   | 4                        | 3                    | 2               | 1              |
| 9. Ideally, how would you change the school program to make things better for him?                                                | Many                     | Some                 | Few             | No             |
| 10. What are your hopes for his future? How has the hearing loss influenced your goals and expectations for him?                  | Very Unrealistic         | Somewhat Unrealistic | Quite Realistic | Very Realistic |
| 11. How do you and your husband differ with respect to your expectations for him, both from a behavioral and academic standpoint? | Many                     | Some                 | Few             | No             |
| 12. Are there experiences or special training which you wish were available that are not offered at the present time?             | Many                     | Some                 | Few             | No             |
| 13. What affect has the hearing loss had on his behavior at home?                                                                 | Marked                   | Definite             | Slight          | No             |
| 14. What kinds of special help and considerations does he require at home?                                                        | Many                     | Some                 | Few             | No             |

## Appendix 9

## Binaural Pure Tone Audiometric Data for Experimental Subjects

| Subj. | Cycles Per Second<br>Right Ear |      |      |     | Cycles Per Second<br>Left Ear |      |      |     | BEA | Group* |
|-------|--------------------------------|------|------|-----|-------------------------------|------|------|-----|-----|--------|
|       | 500                            | 1000 | 2000 | Av. | 500                           | 1000 | 2000 | Av. |     |        |
| 1     | 90                             | 90   | 100  | 93  | 85                            | 85   | 80   | 83  | 83  | 4      |
| 2     | 60                             | 65   | 70   | 65  | 60                            | 70   | 65   | 65  | 65  | 3      |
| 3     | 75                             | 95   | NR   | 90  | 70                            | 70   | 65   | 68  | 68  | 3      |
| 4     | 65                             | 95   | 95   | 85  | 45                            | 65   | NR   | 70  | 70  | 3      |
| 5     | 85                             | 90   | NR   | 92  | 95                            | NR   | NR   | 98  | 92  | 4      |
| 6     | 50                             | 90   | NR   | 80  | 40                            | 70   | NR   | 70  | 70  | 3      |
| 7     | 90                             | NR   | NR   | 97  | NR                            | NR   | NR   | 100 | 97  | 4      |
| 8     | 25                             | 40   | 55   | 40  | 75                            | 70   | 70   | 72  | 40  | 2      |
| 9     | 80                             | 95   | NR   | 92  | NR                            | NR   | NR   | 100 | 92  | 4      |
| 10    | NR                             | NR   | NR   | 100 | NR                            | NR   | NR   | 100 | 100 | 4      |
| 11    | 60                             | 60   | 55   | 58  | 60                            | 55   | 55   | 57  | 57  | 2      |
| 12    | NR                             | NR   | 90   | 97  | NR                            | 80   | 90   | 90  | 90  | 4      |
| 13    | 95                             | 100  | 95   | 97  | 95                            | 100  | NR   | 98  | 97  | 4      |
| 14    | 70                             | 85   | 90   | 82  | 35                            | 70   | NR   | 68  | 68  | 3      |
| 15    | 75                             | 80   | 80   | 78  | 75                            | 80   | 75   | 77  | 77  | 4      |
| 16    | 55                             | 70   | 80   | 68  | 70                            | 75   | 80   | 75  | 68  | 3      |
| 17    | 45                             | 65   | 75   | 62  | 75                            | 60   | 85   | 80  | 62  | 3      |
| 18    | 90                             | 100  | 75   | 88  | NR                            | NR   | 95   | 98  | 88  | 4      |
| 19    | 95                             | NR   | NR   | 98  | 90                            | NR   | NR   | 97  | 97  | 4      |
| 20    | 95                             | NR   | NR   | 98  | 85                            | 90   | NR   | 92  | 92  | 4      |
| 21    | 85                             | 95   | NR   | 93  | 75                            | 75   | NR   | 83  | 83  | 4      |
| 22    | NR                             | NR   | NR   | 100 | NR                            | NR   | NR   | 100 | 100 | 4      |
| 23    | 65                             | 85   | 85   | 78  | 75                            | 85   | 90   | 83  | 78  | 4      |
| 24    | 60                             | 85   | 95   | 73  | 65                            | 80   | 85   | 77  | 73  | 3      |
| 25    | NR                             | NR   | NR   | 100 | 80                            | NR   | NR   | 93  | 93  | 4      |
| 26    | 45                             | 60   | 50   | 52  | 55                            | 60   | 60   | 58  | 52  | 2      |
| 27    | 60                             | 65   | 55   | 60  | 35                            | 50   | 40   | 42  | 42  | 2      |
| 28    | 25                             | 55   | 55   | 45  | 20                            | 45   | 60   | 42  | 42  | 2      |
| 29    | 50                             | 60   | 70   | 60  | 50                            | 70   | 75   | 65  | 60  | 3      |
| 30    | 30                             | 70   | 65   | 55  | 20                            | 65   | 65   | 50  | 50  | 2      |
| 31    | 25                             | 25   | 50   | 33  | 15                            | 60   | 65   | 47  | 33  | 1      |
| 32    | 35                             | 60   | 65   | 53  | 80                            | 90   | 95   | 88  | 53  | 2      |

- \* Group 1 -- Mild Hearing Loss 20- 39 db  
 Group 2 -- Moderate Hearing Loss 40- 59 db  
 Group 3 -- Severe Hearing Loss 60- 74 db  
 Group 4 -- Profound Hearing Loss 75-100 db

## Appendix 9 (con't)

| Subj. | Right Ear |      |      |     | Left Ear |      |      |     | BEA | Group |
|-------|-----------|------|------|-----|----------|------|------|-----|-----|-------|
|       | 500       | 1000 | 2000 | Av. | 500      | 1000 | 2000 | Av. |     |       |
| 33    | 80        | 85   | 90   | 85  | 75       | 85   | 95   | 85  | 85  | 4     |
| 34    | 100       | NR   | NR   | 100 | 95       | NR   | 100  | 98  | 98½ | 4     |
| 35    | 85        | 85   | 90   | 87  | 70       | 70   | 80   | 73  | 73  | 3     |
| 36    | 45        | 65   | 70   | 60  | 35       | 75   | 70   | 60  | 60  | 3     |
| 37    | 90        | NR   | NR   | 97  | 95       | NR   | NR   | 98  | 97  | 4     |
| 38    | 70        | 80   | 90   | 80  | 60       | 65   | 85   | 70  | 70  | 3     |
| 39    | 55        | 50   | 50   | 52  | 85       | 100  | 100  | 95  | 52  | 2     |
| 40    | 40        | 55   | 45   | 47  | 30       | 35   | 45   | 37  | 37  | 1     |
| 41    | 50        | 60   | 60   | 57  | 35       | 45   | 65   | 48  | 48  | 2     |
| 42    | 70        | 85   | 80   | 78  | 70       | 80   | 80   | 77  | 77  | 4     |
| 43    | 85        | 80   | 85   | 83  | 90       | 70   | 60   | 73  | 73  | 3     |
| 44    | 75        | 95   | NR   | 90  | 75       | 95   | 95   | 88  | 88  | 4     |
| 45    | 75        | 75   | 65   | 72  | 70       | 75   | 80   | 75  | 72  | 3     |
| 46    | 95        | NR   | NR   | 98  | 85       | 85   | 65   | 78  | 78  | 4     |
| 47    | 70        | 75   | 70   | 72  | 60       | 75   | 75   | 70  | 70  | 3     |
| 48    | 70        | 90   | 95   | 85  | 70       | 85   | 95   | 83  | 83  | 4     |
| 49    | 95        | NR   | NR   | 98  | 90       | 95   | 75   | 87  | 87  | 4     |
| 50    | 60        | 65   | 65   | 63  | NR       | NR   | 95   | 98  | 63  | 3     |
| 51    | 85        | 95   | 100  | 93  | 90       | 95   | NR   | 95  | 93  | 4     |
| 52    | 40        | 35   | 50   | 42  | 45       | 45   | 45   | 45  | 42  | 2     |
| 53    | 35        | 55   | 60   | 50  | 40       | 55   | 95   | 63  | 50  | 2     |
| 54    | 35        | 40   | 45   | 40  | 50       | 55   | 65   | 57  | 40  | 2     |
| 55    | 30        | 45   | 65   | 47  | 40       | 55   | 50   | 48  | 47  | 2     |
| 56    | 30        | 45   | 65   | 47  | 10       | 40   | 50   | 33  | 33  | 1     |
| 57    | 20        | 35   | 20   | 25  | 50       | 65   | 45   | 53  | 25  | 1     |
| 58    | 60        | 70   | 65   | 65  | 60       | 75   | 75   | 70  | 65  | 3     |
| 59    | 10        | 50   | 70   | 43  | 10       | 55   | 65   | 43  | 43  | 2     |
| 60    | 25        | 40   | 45   | 37  | 25       | 40   | 50   | 38  | 37  | 1     |
| 61    | 60        | 70   | 70   | 67  | 45       | 30   | 65   | 47  | 47  | 2     |
| 62    | 85        | 95   | 95   | 92  | 60       | 65   | 60   | 62  | 62  | 3     |
| 63    | 60        | 65   | 55   | 60  | 40       | 55   | 50   | 48  | 48  | 2     |
| 64    | 70        | 95   | 95   | 87  | 50       | 85   | 85   | 73  | 73  | 3     |
| 65    | 55        | 50   | 65   | 57  | NR       | NR   | NR   | 100 | 57  | 2     |
| 66    | 20        | 55   | 60   | 45  | 25       | 55   | 60   | 47  | 45  | 2     |
| 67    | 45        | 50   | 45   | 45  | 15       | 25   | NR   | 47  | 45  | 2     |
| 68    | 70        | 70   | 60   | 67  | NR       | NR   | NR   | 100 | 67  | 3     |
| 69    | 50        | 30   | 20   | 33  | 70       | 60   | 50   | 60  | 33  | 1     |
| 70    | 35        | 45   | 45   | 42  | 40       | 50   | 40   | 43  | 42  | 2     |
| 71    | 30        | 45   | 30   | 35  | 45       | 45   | 50   | 47  | 35  | 1     |
| 72    | 45        | 55   | 45   | 48  | 45       | 50   | 50   | 48  | 48  | 2     |
| 73    | 35        | 35   | 35   | 35  | 60       | 50   | 40   | 50  | 35  | 1     |
| 74    | 25        | 20   | 45   | 30  | 20       | 25   | 35   | 27  | 27  | 1     |



## Appendix 9 (con't)

| <u>Subj.</u> | <u>Right Ear</u> |             |             |            | <u>Left Ear</u> |             |             |            | <u>BEA</u> | <u>Group</u> |
|--------------|------------------|-------------|-------------|------------|-----------------|-------------|-------------|------------|------------|--------------|
|              | <u>500</u>       | <u>1000</u> | <u>2000</u> | <u>Av.</u> | <u>500</u>      | <u>1000</u> | <u>2000</u> | <u>Av.</u> |            |              |
| 75           | 45               | 50          | 70          | 55         | 65              | 60          | 60          | 62         | 55         | 2            |
| 76           | 20               | 20          | 20          | 20         | 25              | 55          | 60          | 47         | 20         | 1            |
| 77           | 50               | 45          | 55          | 45         | 70              | 80          | 80          | 77         | 45         | 2            |

## Appendix 10

Mann-Whitney U Test

## Social Behavior Trend Index

1. Regular Classroom Teacher vs. Special Teacher (O.T.C.)

$$n_1=10 \quad n_2=10$$

$$U = 20 \text{ (formula 6.7a, Siegel, pp. 120)}$$

$$\text{Alpha .025 (one tail)} = 23$$

Reject  $H_1$  (that there is no difference in the scores / ratings given the E subjects by the special teacher and the regular teacher). Conclude that the special teachers give more favorable ratings than the regular teachers.

2. Regular Classroom Teacher vs. Special Teacher (H.H.)

$$n_1=10 \quad n_2=10$$

$$U = 4$$

$$\text{Alpha .0001 critical value} = 10$$

Reject  $H_1$  ( that the special teacher and regular teacher rate E and C subjects similarly) and conclude a significant difference between these raters, the special teacher assigning significantly higher ratings than the regular teacher.



## Social Behavior Trend Index

## Q-Score and Percentiles\*

| ORAL TRAINING UNITS |                 |      |      |      |                 |      |      |      |
|---------------------|-----------------|------|------|------|-----------------|------|------|------|
| Item                | Special Teacher |      |      |      | Regular Teacher |      |      |      |
|                     | 25%             | 50%  | 75%  | Q    | 25%             | 50%  | 75%  | Q    |
| 1                   | 1.04            | 1.88 | 3.08 | 2.04 | 1.65            | 2.38 | 3.28 | 1.63 |
| 2                   | 1.00            | 1.48 | 3.75 | 2.75 | 1.00            | 3.69 | 5.10 | 4.10 |
| 3                   | 1.42            | 3.12 | 4.30 | 2.88 | 3.15            | 4.54 | 5.38 | 2.23 |
| 4                   | 1.00            | 1.81 | 3.25 | 2.25 | 2.29            | 3.78 | 5.06 | 2.77 |
| 5                   | 1.00            | 2.34 | 3.15 | 2.15 | 1.98            | 2.95 | 4.35 | 2.37 |
| 6                   | 1.10            | 2.31 | 3.86 | 2.76 | 2.66            | 3.80 | 4.68 | 2.02 |
| 7                   | 1.24            | 2.28 | 3.98 | 2.74 | 1.65            | 2.82 | 4.12 | 2.37 |
| 8                   | 1.00            | 1.46 | 2.42 | 1.42 | 1.06            | 1.54 | 2.41 | 1.35 |
| 9                   | 1.30            | 2.58 | 3.65 | 2.35 | 2.24            | 2.88 | 4.00 | 1.76 |
| 10                  | 1.00            | 2.78 | 3.96 | 2.96 | 1.28            | 2.14 | 2.89 | 1.61 |

| HARD OF HEARING CLASSES |                 |      |      |      |                 |      |      |      |
|-------------------------|-----------------|------|------|------|-----------------|------|------|------|
| Item                    | Special Teacher |      |      |      | Regular Teacher |      |      |      |
|                         | 25%             | 50%  | 75%  | Q    | 25%             | 50%  | 75%  | Q    |
| 1                       | 1.25            | 2.22 | 3.32 | 2.07 | 1.88            | 3.39 | 4.69 | 2.81 |
| 2                       | 1.00            | 2.02 | 3.24 | 2.24 | 1.32            | 4.32 | 5.80 | 4.48 |
| 3                       | 1.00            | 2.43 | 3.73 | 2.73 | 2.50            | 4.85 | 5.98 | 3.48 |
| 4                       | 1.12            | 1.92 | 3.82 | 2.70 | 2.69            | 4.00 | 5.62 | 2.93 |
| 5                       | 1.00            | 2.45 | 3.38 | 2.38 | 1.68            | 3.20 | 4.82 | 3.14 |
| 6                       | 2.32            | 3.28 | 4.42 | 2.10 | 2.09            | 3.42 | 4.68 | 2.59 |
| 7                       | 1.62            | 2.72 | 4.20 | 2.58 | 2.08            | 3.18 | 4.58 | 2.50 |
| 8                       | 1.48            | 2.48 | 3.72 | 2.24 | 1.64            | 2.92 | 4.12 | 2.48 |
| 9                       | 1.64            | 2.78 | 4.22 | 2.58 | 1.81            | 3.72 | 5.25 | 3.44 |
| 10                      | 1.82            | 2.98 | 4.36 | 2.54 | 1.14            | 3.92 | 5.18 | 4.04 |

\* Note: The median scale values (50th percentile), altered for computation purposes, have the following meaning relative to the seven point Index continuum: 7= +3, 6= +2, 5= +1, 4= 0, 3= -1, 2= -2, 1= -3.



## Appendix 1 lb

Cumulative Responses for  
PARENT QUESTIONNAIRE

| Item*      | Never True<br>+2 |     | Seldom True<br>+1 |    | Sometimes True<br>-1 |    | Often True<br>-2 |    |
|------------|------------------|-----|-------------------|----|----------------------|----|------------------|----|
|            |                  |     |                   |    |                      |    |                  |    |
|            | OTC              | HH  | OTC               | HH | OTC                  | HH | OTC              | HH |
| 1          | 12               | 10  | 11                | 7  | 2                    | 2  | 8                | 7  |
| 2          | 12               | 10  | 10                | 7  | 3                    | 4  | 8                | 8  |
| 3          | 13               | 13  | 8                 | 1  | 6                    | 5  | 6                | 7  |
| 4          | 8                | 11  | 3                 | 1  | 10                   | 9  | 12               | 5  |
| 5          | 19               | 20  | 7                 | 1  | 5                    | 4  | 1                | 2  |
| 6          | 19               | 22  | 6                 | 2  | 7                    | 2  | 1                | 0  |
| 7          | 6                | 7   | 3                 | 3  | 6                    | 5  | 18               | 11 |
| 8          | 10               | 9   | 8                 | 0  | 4                    | 5  | 11               | 12 |
| 9          | 1                | 7   | 5                 | 5  | 10                   | 5  | 17               | 9  |
| 10         | 3                | 11  | 9                 | 3  | 8                    | 5  | 13               | 7  |
| 11         | 8                | 13  | 6                 | 3  | 8                    | 4  | 11               | 6  |
| 12         | 17               | 17  | 6                 | 0  | 4                    | 7  | 5                | 3  |
| 13         | 22               | 21  | 6                 | 0  | 3                    | 0  | 2                | 5  |
| 14         | 9                | 6   | 6                 | 4  | 9                    | 5  | 9                | 11 |
| Sub-Totals | 159              | 177 | 94                | 34 | 85                   | 62 | 122              | 93 |
| TOTAL      | 336              |     | 128               |    | 147                  |    | 215              |    |

N=33 OTC

N=26 HH

\*For wording of item see Appendix 9.

## Appendix 12

## Achievement Data for Experimental Subjects

| Subject | Test | C. A.<br>(years) | Reading | Arithmetic | Language | Grade Retarda-<br>tion (months) |
|---------|------|------------------|---------|------------|----------|---------------------------------|
| 7       | I*   | 7.9              | 2.4     |            |          | 4                               |
| 8       | I    | 8.6              | 2.0     |            |          | 9                               |
| 12      | I    | 9.1              | 2.0     |            |          | 9                               |
| 17      | I    | 11.4             | 1.8     |            |          | 25                              |
| 19      | I    | 9.11             | 2.5     |            |          | 14                              |
| 20      | I    | 6.5              | 2.4     |            |          | 6                               |
| 22      | I    | 6.8              | 2.7     |            |          | 9                               |
| 23      | I    | 6.2              | 2.4     |            |          | 8                               |
| 25      | I    | 7.6              | 2.7     |            |          | 5                               |
| 35      | I    | 11.1             | 2.8     |            |          | 17                              |
| 42      | I    | 9.5              | 2.6     |            |          | 8                               |
| 45      | I    | 7.8              | 2.5     |            |          | 0                               |
| 46      | I    | 10.0             | 2.2     |            |          | 15                              |
| 47      | I    | 9.9              | 2.1     |            |          | 15                              |
| 48      | I    | 6.10             | 2.6     |            |          | 10                              |
| 49      | I    | 8.11             | 2.5     |            |          | 7                               |
| 50      | I    | 6.5              | 2.2     |            |          | 6                               |
| 52      | I    | 7.4              | 3.1     |            |          | 41                              |
| 54      | I    | 8.2              | 3.1     |            |          | 42                              |
| 60      | I    | 7.8              | 2.6     |            |          | 10                              |
| 62      | I    | 9.0              | 3.3     |            |          | 5                               |
| 65      | I    | 19.4             | 2.3     |            |          | 73                              |
| 66      | I    | 16.2             | 1.6     |            |          | 56                              |
| 69      | I    | 16.6             | 2.3     |            |          | 54                              |
| 73      | I    | 18.2             | 2.4     |            |          | 63                              |
| 75      | I    | 12.11            | 2.9     |            |          | 29                              |
| 76      | I    | 15.10            | 2.0     |            |          | 52                              |
| 9       | II   | 11.0             | 2.8     |            |          | 15                              |
| 10      | II   | 11.3             | 3.5     |            |          | 15                              |
| 11      | II   | 11.5             | 2.6     |            |          | 20                              |
| 13      | II   | 13.1             | 2.1     |            |          | 33                              |
| 14      | II   | 12.0             | 2.6     |            |          | 22                              |
| 15      | II   | 10.0             | 2.1     |            |          | 14                              |
| 16      | II   | 12.6             | 2.8     |            |          | 25                              |

\* I Gates Primary Reading Test - Types PWR, PSR, PPR

II Gates Advanced Primary Reading Tests - Types AWR, APR

III California Achievement Tests - Elementary

IV California Achievement Tests - Junior High Level

## Appendix 12 (con't)

| Subject | Test | C. A.<br>(years) | Reading | Arithmetic | Language | Grade Retarda-<br>tion (months) |
|---------|------|------------------|---------|------------|----------|---------------------------------|
| 18      | II   | 8.2              | 2.5     |            |          | 2                               |
| 26      | II   | 10.6             | 2.7     |            |          | 15                              |
| 27      | II   | 10.6             | 2.6     |            |          | 19                              |
| 28      | II   | 11.10            | 3.1     |            |          | 22                              |
| 29      | II   | 10.5             | 3.2     |            |          | 12                              |
| 30      | II   | 10.2             | 3.7     |            |          | 10                              |
| 31      | II   | 9.2              | 5.4     |            |          | 164                             |
| 32      | II   | 10.4             | 3.8     |            |          | 8                               |
| 33      | II   | 11.2             | 3.5     |            |          | 14                              |
| 36      | II   |                  | 3.8     |            |          | 19                              |
| 67      | II   | 13.2             | 3.1     |            |          | 36                              |
| 70      | II   | 14.9             | 2.4     |            |          | 43                              |
| 77      | II   | 17.0             | 2.8     |            |          | 54                              |
| 37      | III  | 12.5             | 3.5     | 6.1        | 5.3      | 11                              |
| 38      | III  | 13.5             | 3.1     | 3.9        | 4.4      | 22                              |
| 41      | III  | 17.3             | 4.9     | 8.2        | 5.0      | 36                              |
| 53      | III  | 13.5             | 6.4     | 6.7        | 7.5      | 12                              |
| 55      | III  | 11.3             | 9.4     | 8.5        | 8.5      | 294                             |
| 56      | III  | 11.6             | 6.2     | 6.0        | 7.0      | 24                              |
| 57      | III  | 10.2             | 7.0     | 6.9        | 7.0      | 214                             |
| 63      | III  | 9.5              | 4.6     | 5.8        | 7.3      | 174                             |
| 34      | IV   | 15.3             | 5.9     | 7.0        | 8.0      | 15                              |
| 39      | IV   | 16.1             | 5.8     | 5.8        | 6.0      | 24                              |
| 40      | IV   | 14.4             | 6.3     | 6.5        | 6.3      | 13                              |
| 58      | IV   | 12.11            | 7.2     | 7.7        | 8.2      | 14                              |
| 59      | IV   | 14.9             | 6.6     | 9.7        | 8.4      | 6                               |
| 61      | IV   | 13.5             | 5.2     | 5.4        | 6.6      | 18                              |



## Appendix 13

Public School Program: Distribution of Item Responses Obtained  
from Parents of Total, Monaural, and Binaural Experimental  
and Control Groups

| Item* | Group              | Never | Sometimes | Most Time | Always |
|-------|--------------------|-------|-----------|-----------|--------|
| 1     | Total Experimental | 5     | 19        | 62        | 29     |
|       | Total Control      | 0     | 16        | 63        | 38     |
|       | Monaural Exper.    | 1     | 9         | 33        | 19     |
|       | Monaural Control   | 0     | 8         | 34        | 22     |
|       | Binaural Exper.    | 4     | 10        | 29        | 10     |
|       | Binaural Control   | 0     | 8         | 29        | 16     |
| 2     | Total Experimental | 10    | 89        | 14        | 2      |
|       | Total Control      | 22    | 89        | 5         | 1      |
|       | Monaural Exper.    | 4     | 47        | 10        | 1      |
|       | Monaural Control   | 16    | 43        | 3         | 0      |
|       | Binaural Exper.    | 6     | 42        | 4         | 1      |
|       | Binaural Control   | 6     | 46        | 2         | 1      |
| 3     | Total Experimental | 38    | 59        | 15        | 4      |
|       | Total Control      | 87    | 24        | 4         | 1      |
|       | Monaural Exper.    | 21    | 31        | 7         | 3      |
|       | Monaural Control   | 50    | 12        | 1         | 0      |
|       | Binaural Exper.    | 17    | 28        | 8         | 1      |
|       | Binaural Control   | 37    | 12        | 3         | 1      |
| 4     | Total Experimental | 38    | 44        | 23        | 12     |
|       | Total Control      | 42    | 34        | 24        | 13     |
|       | Monaural Exper.    | 19    | 25        | 10        | 8      |
|       | Monaural Control   | 26    | 16        | 16        | 5      |
|       | Binaural Exper.    | 19    | 19        | 13        | 4      |
|       | Binaural Control   | 16    | 18        | 8         | 8      |
| 5     | Total Experimental | 4     | 26        | 50        | 34     |
|       | Total Control      | 2     | 17        | 62        | 38     |
|       | Monaural Exper.    | 2     | 11        | 28        | 20     |
|       | Monaural Control   | 2     | 10        | 31        | 22     |
|       | Binaural Exper.    | 2     | 15        | 22        | 14     |
|       | Binaural Control   | 0     | 7         | 31        | 16     |

(Continued on Page 162)

## Appendix 13 (Continued)

| Item* | Group              | Never | Sometimes | Most Time | Always |
|-------|--------------------|-------|-----------|-----------|--------|
| 6     | Total Experimental | 32    | 54        | 20        | 10     |
|       | Total Control      | 34    | 67        | 12        | 5      |
|       | Monaural Exper.    | 13    | 30        | 13        | 6      |
|       | Monaural Control   | 17    | 39        | 5         | 3      |
|       | Binaural Exper.    | 19    | 24        | 7         | 4      |
|       | Binaural Control   | 17    | 28        | 7         | 2      |
| 7     | Total Experimental | 21    | 58        | 26        | 9      |
|       | Total Control      | 23    | 76        | 10        | 5      |
|       | Monaural Exper.    | 10    | 27        | 17        | 9      |
|       | Monaural Control   | 13    | 44        | 4         | 2      |
|       | Binaural Exper.    | 11    | 31        | 9         | 0      |
|       | Binaural Control   | 10    | 32        | 6         | 3      |
| 8     | Total Experimental | 3     | 26        | 57        | 30     |
|       | Total Control      | 0     | 7         | 58        | 53     |
|       | Monaural Exper.    | 1     | 11        | 33        | 17     |
|       | Monaural Control   | 0     | 1         | 32        | 31     |
|       | Binaural Exper.    | 2     | 15        | 24        | 13     |
|       | Binaural Control   | 0     | 6         | 26        | 22     |
| 9     | Total Experimental | 24    | 46        | 22        | 23     |
|       | Total Control      | 50    | 54        | 8         | 6      |
|       | Monaural Exper.    | 13    | 24        | 13        | 12     |
|       | Monaural Control   | 30    | 25        | 3         | 5      |
|       | Binaural Exper.    | 11    | 22        | 9         | 11     |
|       | Binaural Control   | 20    | 29        | 5         | 1      |

## \* Items

1. Is popular with other boys and girls.
2. Misunderstands instructions.
3. Strains to hear person talking.
4. Watches face of speaker closely.
5. Seems interested in conversation.
6. Seems restless or tires easily.
7. Angers easily.
8. Understands other children when playing.
9. Plays radio or TV too loud.

## Appendix 14

Public School Program: Distribution of Means and  
Mean Differences for IQ Scores

| Group                         | N   | Mean   | Mean Difference |
|-------------------------------|-----|--------|-----------------|
| <b>A. <u>Total Groups</u></b> |     |        |                 |
| 1. Experimental               | 150 | 100.46 | 5.44            |
| Control                       | 150 | 105.90 |                 |
| 2. Monaural Experimental      | 79  | 102.22 | 1.65            |
| Monaural Control              | 79  | 103.87 |                 |
| 3. Binaural Experimental      | 71  | 98.51  | 9.64            |
| Binaural Control              | 71  | 108.15 |                 |
| 4. Male Experimental          | 75  | 104.16 | 3.67            |
| Male Control                  | 69  | 107.83 |                 |
| 5. Female Experimental        | 75  | 96.76  | 7.50            |
| Female Control                | 81  | 104.26 |                 |
| <b>B. <u>Levels</u></b>       |     |        |                 |
| I. Binaural Experimental      | 17  | 106.76 | 4.24            |
| Binaural Control              | 17  | 111.00 |                 |
| II. Binaural Experimental     | 30  | 96.20  | 9.40            |
| Binaural Control              | 30  | 105.60 |                 |
| III. Binaural Experimental    | 15  | 97.93  | 11.80           |
| Binaural Control              | 15  | 109.73 |                 |
| IV. Binaural Experimental     | 9   | 91.56  | 17.11           |
| Binaural Control              | 9   | 108.67 |                 |
| <b>C. <u>Sex and Race</u></b> |     |        |                 |
| 1. <u>Females:</u>            |     |        |                 |
| Binaural Experimental         | 36  | 93.97  | 10.89           |
| Binaural Control              | 43  | 104.86 |                 |
| 2. <u>Female White:</u>       |     |        |                 |
| Experimental                  | 27  | 98.33  | 6.20            |
| Control                       | 30  | 104.53 |                 |
| 3. <u>Female Negro:</u>       |     |        |                 |
| Experimental                  | 9   | 80.89  | 24.73           |
| Control                       | 13  | 105.62 |                 |



DEPARTMENT OF  
HEALTH, EDUCATION AND WELFARE  
Office of Education  
Cooperative Research Branch

Project Description

Title: An Assessment of Behavioral and Academic Implications of Hearing Loss Among School Children (L92/USOE)

Investigator: M. D. Steer, Director of the Speech and Hearing Clinic and Professor of Speech

Institution: Purdue University, Lafayette, Indiana

Starting Date: February 1959

Closing Date: July 1960

PROBLEM

~~This study attempts to determine the relationship between hearing loss among children and academic deficiencies and maladjustment.~~

MAJOR OBJECTIVE

The objective is to determine the relationship, if any, between audiometric findings and intelligence, academic achievement, social maturation, and adjustment to the school situation.

PROCEDURES AND DESIGN

Children in grades 4 and/or 7 with any one of four major categories of hearing loss will be selected from a wide variety of schools and, along with matched control groups, will be given intelligence and achievement tests. In addition, data related to school achievement and adjustment will be collected with structured interviews and sociometric techniques. First order and multiple correlation techniques will be used to analyze the data in an attempt to determine to what degree specified levels and types of hearing loss related to functional auditory handicaps are reflected by academic deficiencies and maladjustment.

END

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